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ABSTRACT

Presented are analyses of likely effects of implementing either a regional or state-wide library network for the State of Washington. If a more sophisticated system is adopted over the present system, the functions of interlibrary loan, technical services, and collection management would be facilitated through new organizational arrangements. It is essential to consider the consequences in terms of both cost and benefits and their distribution among participating libraries. This research also demonstrates the need for a more extensive and reliable data base regarding library operations in the state. While this study has been primarily concerned with operating costs, estimates must be made of initial costs of setting up a new network, such as investment in computer hardware and other equipment, development of procedures and software, and employee training. (LS)

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State of Washington

Part I: Text

Maryan E. Reynolds
David W. Taylor
Robert C. Meier
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Maryan E. Reynolds, Washington State Librarian, served as Principal Investigator for the project. David W. Taylor, Associate State Librarian, Planning and Research, served as Project Director. Faculty at the University of Washington which participated in the project were Robert C. Meier of the Graduate School of Business Administration, Roger L. Miller of the Department of Economics, William V. Nash of the School of Librarianship, and Jonathan Stanfield of the School of Librarianship. Dr. Meier was concerned principally with the analysis of alternate network configurations. Dr. Miller, assisted in the early stages by Dr. Philip M. Ginsberg, worked on economic considerations and regression analyses. Dr. Stanfield was responsible for the Automation of Technical Services Appendix and completed the work begun by Dr. Nash on administrators' attitudes regarding the proposed network. Dr. Nash, who was killed in an automobile accident in July 1970, prepared the Administrators' Attitude questionnaire and began analysis of results obtained from it. Dr. Stanfield completed the analysis and prepared the written report of it.

Joseph Becker and Robert M. Hayes, authors of A Proposed Library Network for the State of Washington, served as consultants to the project. William Scholz and William Larsen both of the Washington State Library assisted Mr. Taylor.

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CHAPTER 1

INTRODUCTION, METHODS, PRINCIPAL RESULTS

In 1966 Congress added an Interlibrary Cooperation Title to the Library Services and Construction Act. The Washington State Library Commission immediately appointed an Interlibrary Cooperation Advisory Council as required, representing the library profession and the general public. The Advisory Council recommended to the State Library Commission a program of action which included retaining a consultant team to design a long range plan based on guidelines established by the Council. The State Library Commission retained Becker and Hayes, who developed A Proposed Library Network for the State of Washington¹. The Advisory Council and the State Library Commission accepted the proposed plan in concept (Fall of 1967) and directed the Washington State Library staff to provide the profession with an opportunity to discuss, criticize, and accept or reject the concept. This was done through a series of meetings around the state in the Spring of 1968. Thoughtful suggestions for improvement were made by the more than 1,000 librarians who attended the series. The concept was accepted, and the State Library was designated the agency for moving ahead on further planning and implementation. The stimulus of the Interlibrary Cooperation Funds, slight though they were, resulted in planning for library development moving ahead at a more rapid pace. The program concept was also accepted by the state administration. As the State Library and the Budget office worked to develop funding analysis, it became clear that much more information was needed before good cost analysis could be developed. The Council, State Library Commission and the State Library staff agreed that research funds should be sought to enable us to develop ways of evaluating alternate approaches to network development.

Staff at the Washington State Library together with faculty at the University of Washington prepared the research proposal and submitted it to the U.S. Commissioner of Education in January 1969. Announcement of proposal acceptance was received in June and the duration of research activity set for June 16, 1969 to June 15, 1970. The end date for the project was later extended to October 31, 1970.

The initial intent of the research project was to construct a quantitative model which would assist in making decisions regarding the details of network design such as location and type of data processing equipment, communications procedures and equipment, personnel requirements, and so forth. At a very early stage, however, it became apparent that insufficient quantitative information was available regarding library operations in the state to permit detailed design of a network. Accordingly, efforts were redirected toward obtaining basic data on the scope and characteristics of library activity, and modeling was focused on descriptions of principal library functions for several possible network configurations.

1.1 Methods

The project was conducted in two phases; first, data collection,

second, analysis and modeling. Data collection extended from the inception of the study until the Spring of 1970. A sample of 33 libraries was selected which consisted of 20 municipal, county and regional public libraries (including the 19 largest), the two state universities, 3 state colleges, 7 community colleges and the Washington State Library. Data gathered were in the areas of book holdings, book collection overlap, interlibrary loans and circulation. Techniques used in this survey are described in detail in later sections. In addition, special studies were conducted, such as the circulation analyses reported in Appendix B.

Two questionnaires were utilized; one for cost information on technical services, the other for a survey of administrators' attitudes concerning networking. Results obtained from these questionnaires are presented in Chapter 3 and Chapter 5 respectively.

In the Spring of 1970 project emphasis shifted to analysis and modeling. Major activities included the development of computer programs in analyzing alternate network configurations for interlibrary loan, technical services and collection management; analysis by computer of large samples of circulation records; and correlation and multiple regression analyses to develop quantitative descriptions of a variety of existing library phenomena. Other analytical efforts were focused on development of a translation table between Library of Congress and Dewey Decimal classification schemes; and construction of a book collection overlap matrix for the 33 libraries.

1.2 Principal Results

Three different types of results were obtained from the research study. These are listed below and have been grouped according to whether they relate to methodological developments, library operations in general, or specifically to the selection of a network configuration. References in parentheses indicate the location in this report where each item is discussed in detail.

1.2.1 Methodological Developments

- a) Quantitative models of the functions of interlibrary loan, technical services, and collection management were developed for each of three system configurations; the present system, a regional network, and a state-wide network. (Secs. 2.2, 3.2, and 4.2)
- b) Computer programs were written to carry out the calculations required by the models. (Appendix F)
- c) A Technical Services Cost questionnaire was designed. (Appendix C)

- d) An Administrative Attitude questionnaire was designed. (Appendix E)
- e) An L.C.-Dewey translation table was constructed with data supplied by a computer program written to analyze the relationships between the two systems. (Appendix A)
- f) A book collection overlap matrix was constructed. (Appendix A)
- g) A computer program was developed for analysis of book circulation records. (Appendix B)
- h) A model was developed to evaluate the automation of technical services. (Appendix D)

1.2.2 Library Operations

- a) Approximately 90% of books published in the United States during 1968 were acquired by the state's libraries. (Sec. 4.1)
- b) Overlap of book collections is such that 10 libraries can supply approximately 95% of the titles available in all libraries in the state. (Table 4.3)
- c) Over 50% of the titles in each of three libraries studied did not circulate during the periods studied. (Tables 4.6-4.9)
- d) Substantial similarity existed between the age distributions of samples of books circulated by each of the two libraries even though there was considerable difference between the age distributions of their collections. (Figures 4.1 & 4.2)
- e) Costs of providing centralized technical services by automation are similar to costs of providing these services manually. (Sec.D.5, Figure D.4)
- f) Relationships in the form of linear equations are discernible among operational characteristics such as total circulation, additions to the collections, interlibrary loans, etc. (Appendix G)

1.2.3 Network Configurations

- a) Costs. (Sec. 6.1)
 - Estimates of the annual costs of performing the functions of interlibrary loan, technical services, and collections management for three system configurations are as follows:

Present system	\$2,840,000
Regional network	2,265,000
State-wide network	1,625,000

- Adjusting for anticipated increases in interlibrary loans and added communications, estimates of the annual costs of performing the three functions are:

Present system	\$2,840,000
Regional network	2,830,000
State-wide network	2,420,000

- Considering the uncertainty in estimation and the minor differences in adjusted costs, cost considerations alone are insufficient to allow choice between alternate network configurations.

b) Benefits. (Sec. 6.2)

- Both regional and state-wide network configurations offer greater access to library resources than the current system. However, state-wide networking offers by far the larger increase in resource availability.
- Both regional and state-wide network configurations provide an improved base for growth and development. However, state-wide networking is preferred because of the larger scale of anticipated operations which would allow use of advanced technology and specialized personnel.

c) Administrative attitudes. (Sec. 5.5)

- Administrators have generally favorable attitudes toward the concept of a network for the state.
- Centralized technical services and collection management, which are important network concepts in this research study, while considered acceptable by administrators, are ranked lowest in desirability.

REFERENCES

1. Becker, J. and R. M. Hayes. A Proposed Library Network for Washington State. Olympia, Washington State Library, 1967

CHAPTER 2 INTERLIBRARY LOANS

As research on this network project began in the summer of 1968, a study of interlibrary loans and the functioning of the Pacific Northwest Bibliographic Center (PNBC) by Mrs. Lura G. Currier had already begun. It was decided, therefore, that another comprehensive survey of interlibrary loans would be redundant and that this project would concern itself with the general operation of interlibrary loan within the state and would focus on the quantitative aspects of the service, especially as these would relate to network design. Data have been assembled from the Currier report,¹ Annual Statistical issues of the Library News Bulletin, interviews and samples drawn by the research team, and various reports of individual libraries. The combined data from these sources provide a reasonably accurate estimate of statewide interlibrary loan activity.

2.1 Description of Current System

An overview of the volume of interlibrary lending and borrowing is provided in Table 2.1. The distribution of these transactions by the geographical regions suggested in the Becker and Hayes report² is shown in Figure 2.1. Borrowings by individual libraries in the state for 1969 are shown in Appendix F, Figure F.2. The level of interlibrary loan activity varies seasonally through the year with low levels of activity occurring in the summer months and higher levels in the fall and late winter and early spring. For the Washington State Library, for example, activity in 1969-70 varied from a low level of 1,780 requests in August to a high of 5,130 requests in April. Data showing year-to-year changes for three of the organizations most active in interlibrary loans are shown in Table 2.2. The volume of activity is generally increasing, but not at any regular rate. Part of the increase shown for the Washington State Library in 1968, 1969, and 1970 is due to changes in reporting procedures.

Characteristics of interlibrary loan requests are shown in part in Tables 2.3 and 2.4. Table 2.3 is a distribution by age of books from a sample of 2,008 requests at the Washington State Library, 649 requests at PNBC, and 452 requests at the University of Washington. Table 2.4 shows the distribution by Dewey class number of 452 book requests at the University of Washington and 8,305 requests at the Washington State Library. Response times for the Washington State Library and PNBC are summarized in Table 2.5. The times shown in this table are from date of request until shipment of the material, including weekends and holidays. An additional 2-3 days should be added for actual delivery of the material to the requesting location.

Major roles are played in the current interlibrary loan activity by the Washington State Library and PNBC. More than 90% of public library requests are sent to the Washington State Library which is able to fill about 75% of them. Those not filled are routed almost without

TABLE 2.1
ESTIMATED INTERLIBRARY LOAN ACTIVITY, 1969

LENDERS	TOTAL ITEMS LENT	BORROWERS						
		WASHINGTON LIBRARIES				OUT-OF-STATE		
		PUBLIC LIBRARIES	WASHINGTON STATE LIB.	UNIVERSITIES COLLEGES	PUBLIC SCHOOLS	SPECIAL LIBRARIES	ALL OUT-OF- STATE LIBS.	
Washington State Library	27,800	21,700	-	1,100	1,800	3,200	-	
University of Washington	13,800	800	200	2,600	100	4,200	5,900	
Seattle Public Library	11,500	4,200	100	400	100	4,400	2,300	
Everett Public Library	2,000	1,400	-	300	100	100	100	
Tacoma Public Library	1,800	1,200	-	400	-	200	-	
Spokane Public Library	1,000	700	-	150	-	100	50	
Others in State	3,000	900	300	1,200	100	200	300	
Out-of-State	2,100	400	300	1,000	-	400	-	
TOTALS	63,000	31,300	900	7,150	2,200	12,800	8,650	

TABLE 2.2
CHANGES IN INTERLIBRARY LOAN ACTIVITY

FISCAL YEAR	REQUESTS TO WASH. STATE LIBRARY	REQUESTS TO PNBC	ITEMS LOANED BY SEATTLE PUBLIC LIBRARY*
1944-1945	7,100	2,930	2,170
1949-1950	12,160	9,140	2,340
1954-1955	16,320	12,390	N.A.
1959-1960	20,960	12,260	2,870
1964-1965	22,160	16,220	N.A.
1965-1966	22,900	16,080	7,370
1966-1967	22,980	18,120	7,840
1967-1968	22,970	19,370	10,580
1968-1969	31,330	17,510	12,820
1969-1970	36,070	17,770	11,430

*Data are for calendar years; 1944, 1949, etc.

TABLE 2.3
AGES OF INTERLIBRARY LOAN BOOK REQUESTS

	WASH. STATE LIB.		UNIV. OF WASHINGTON		INBC			
YEAR	VOLUMES	CUM. PERCENT	VOLUMES	CUM. PERCENT	VOLUMES	CUM. PERCENT		
1969	130	6.5	2	.9	28	4.3		
1968	200	16.4	19	9.5				
1967	165	24.7	22	19.4				
1966	159	32.6	7	22.5				
1965	147	39.8	16	29.7	208	36.4		
1964	123	46.0	11	34.7				
1963	128	52.4	19	43.2				
1962	108	57.8	9	47.3				
1961	104	62.9	6	50.0				
1960	74	66.6	5	52.2				
1959	59	69.6	3	53.6			103	52.2
1958	70	73.1	11	58.5				
1957	59	76.0	1	59.0				
1956	42	78.1	3	60.3				
1955	40	80.1	7	63.5				
1954	30	81.6	2	64.4				
1953	20	82.6	2	65.3				
1952	20	83.6	1	65.7				
1951	24	84.8	6	68.4	310	100.0		
1950	27	86.1	1	68.9				
1949	11	86.7	5	71.1				
1948	12	87.3	4	72.9				
1947	4	87.5	5	75.2				
1946	15	88.2	0	75.2				
1945	10	88.7	1	75.6				
1944	7	89.0	0	75.6				
1943	11	89.6	1	76.1				
1942	10	90.1	1	76.5				
1941	6	90.4	0	76.5				
1940	5	90.6	3	77.9				
1930-39	60	93.6	49	100.0				
1920-29	48	96.0						
1910-19	31	97.5						
1900-09	25	98.8						
Bef. 1900	24	100.0						

TABLE 2.4
SUBJECTS OF INTERLIBRARY LOAN BOOK REQUESTS

DEWEY CLASS NO.	UNIVERSITY OF WASHINGTON		WASHINGTON STATE LIBRARY	
	TITLES	PERCENT	TITLES	PERCENT
000	1	0.45	78	.95
100	4	1.80	959	11.54
200	11	4.95	324	3.90
300	39	17.57	1,725	20.79
400	4	1.80	76	.90
500	50	22.53	441	5.30
600	38	17.12	1,908	22.99
700	8	3.60	838	10.09
800	27	12.16	409	4.90
900	40	18.02	833	10.04
Biography	*	-	371	4.45
Fiction	**	-	343	4.15
Totals	222	100.00	8,305	100.00

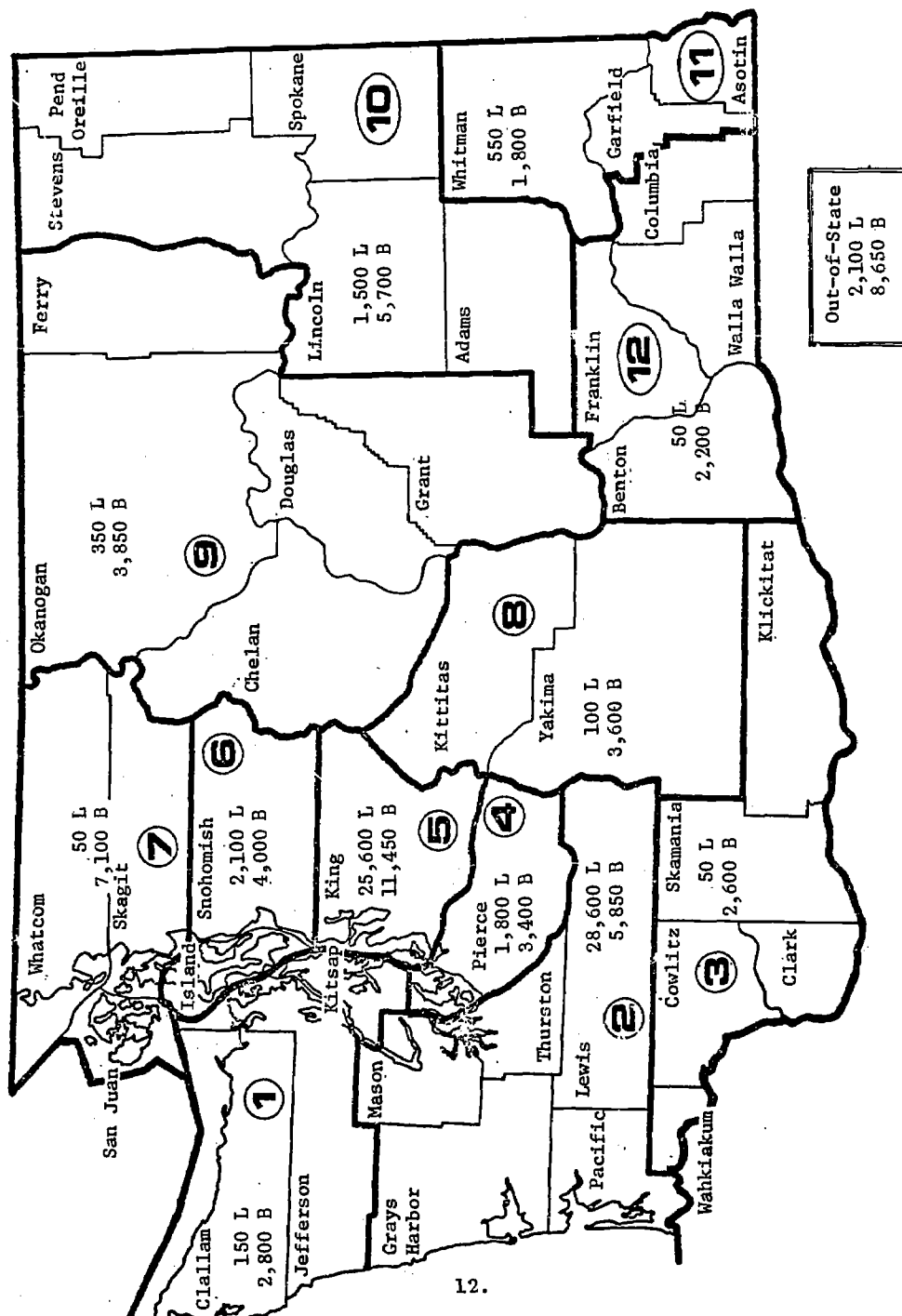
*Included in 900's

**Included in 800's

TABLE 2.5
RESPONSE TIMES TO INTERLIBRARY LOAN REQUESTS

ELAPSED DAYS FROM DATE OF REQUEST UNTIL SHIPMENT OF MATERIAL	WASHINGTON STATE LIBRARY		PACIFIC NORTHWEST BIBLIOGRAPHIC CENTER	
	NUMBER OF CASES	CUM. PERCENT	NUMBER OF CASES	CUM. PERCENT
1	960	18.0	0	0.0
2	787	32.7	33	6.7
3	626	44.5	19	10.5
4	429	52.5	24	15.5
5	245	57.1	8	17.1
6	172	60.3	12	19.5
7	185	63.8	10	21.6
8-10	438	72.0	55	32.8
11-14	366	78.8	133	59.8
15-21	345	85.3	108	81.8
22-31)	786	100.0	48	91.6
More than 31)			42	100.0
TOTALS	5,339		492	

FIGURE 2.1
GEOGRAPHICAL DISTRIBUTION OF INTERLIBRARY LOANING AND BORROWING
(IN VOLUMES, 1969 ESTIMATES)
L = Loans B = Borrowings



exception to PNBC which attempts to locate the material. Seattle Public and Tacoma Public generally deal directly with PNBC as do the academic libraries within the state. Estimated flows of requests and material involving the Washington State Library and PNBC are shown in Figure 2.2. PNBC has a location rate of approximately 85%, having located and sent loan requests for 11,739 out of 14,046 requests received.

2.2 Models of Alternate Systems

To estimate and compare operating characteristics of alternate systems of interlibrary loan, abstract representations of the systems under consideration have been developed. Many alternate system configurations can be devised, but because of time limitations only a few of these can be analyzed in detail. Three have been selected for analysis; the present system, a regional network following regional boundaries suggested in the Becker and Hayes report, and a state-wide network. The models of these three configurations are designed to reflect only aggregate lending and borrowing activity of libraries in the system and do not attempt to estimate specific flows.

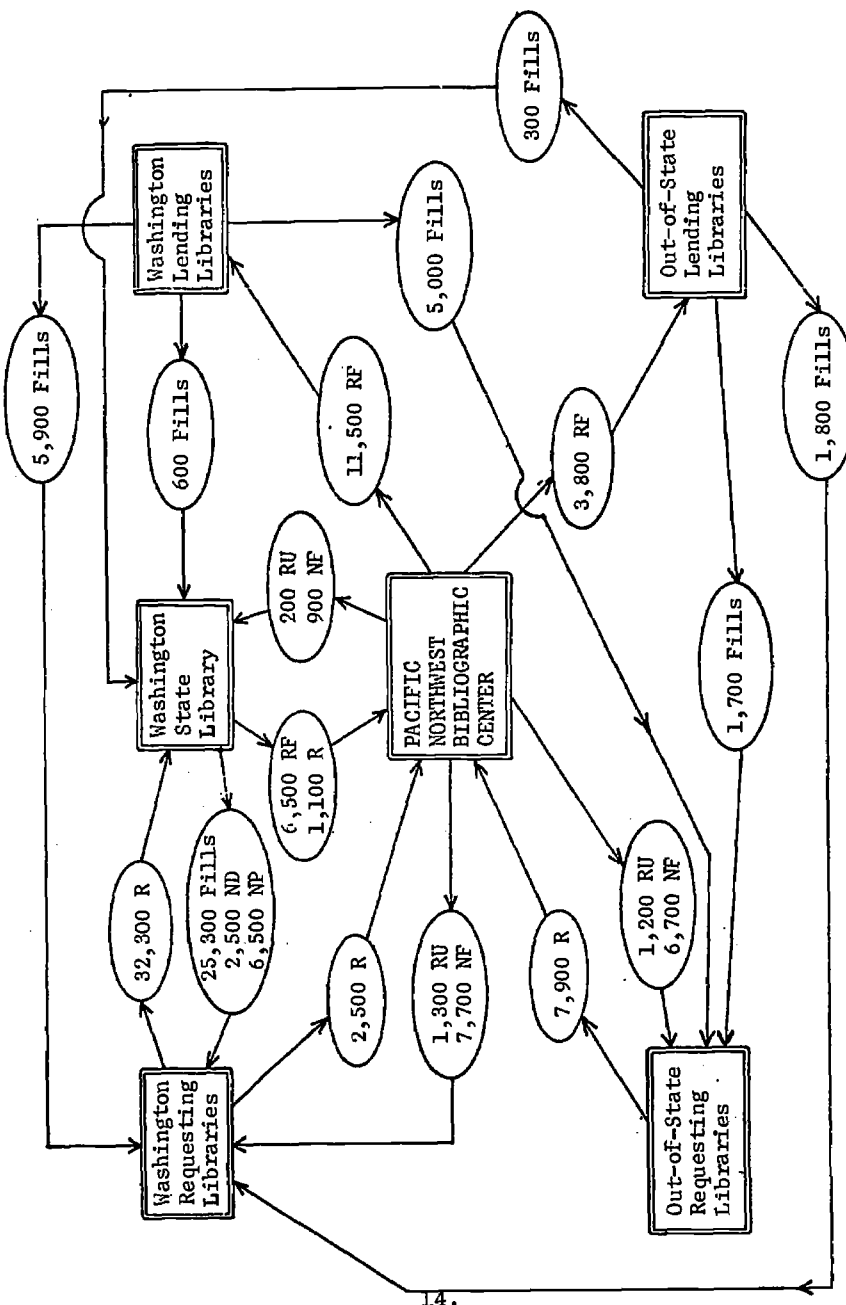
A detailed discussion of the computer program developed to perform the necessary calculations appears in Appendix F; input data to the computer program is shown in Figure F.2. Input data and the subsequent analyses cover only transactions within the state between public libraries, universities, colleges, community colleges, and the Washington State Library. Total transactions as calculated by the program do not equal those shown in Table 2.1. This is because Table 2.1 is constructed on the basis of loans reported by libraries while input to the computer program is the number of borrowings as reported by libraries. Because of these statistical discrepancies in interlibrary loan reporting, estimates of total borrowings are approximately 15% less than estimates of loans. However, since each system configuration analysis uses the same base data, the computed costs provide a satisfactory index for comparison.

For the present system, costs for each library are the sum of borrowing and lending costs. Borrowing costs are the number of volumes borrowed, which is input data, multiplied by \$4.50, the estimated cost per volume borrowed. This estimate is obtained from a study of the State Library's interlibrary loan services and, while not precise, indicates the general magnitude of borrowing costs. Total borrowings are prorated to eight libraries in the state with significant lending activities on the basis of percent of loans in the state as shown in Table 2.6. Lending costs of each of the eight libraries are the number of volumes loaned multiplied by \$1.50, the estimated lending cost per volume. As with borrowing costs, lending costs are based on estimates obtained from the Washington State Library and serve to indicate the magnitude of lending costs rather than providing precise estimates.

FIGURE 2.2

ESTIMATED INTERLIBRARY LOAN FLOW, 1969

(FOR REQUESTS RECEIVED BY WASHINGTON STATE LIBRARY AND PNBC ONLY)



LEGEND: R = Multiple copies of ILL requests.
 RU = Request returned unfillable.
 RF = Request forwarded.
 ND = Notification of delay in filling.
 FILLS = Material shipped filling ILL request.

NF = Notification that request has been forwarded to lending library.
 NP = Notification that request has been forwarded to PNBC.

TABLE 2.6
ESTIMATED PROPORTION OF LOANS MADE BY MAJOR LENDING LIBRARIES
TO LIBRARIES WITHIN WASHINGTON STATE*

LENDING LIBRARY	PERCENT OF ALL LOANS
Washington State Library	63
Seattle Public	13
University of Washington	10
Everett Public	4
Tacoma Public	4
Spokane Public	2
Washington State University	2
Timberland Regional	<u>2</u> 100

* Based on data reported by libraries. Loans made by public school, special, and out-of-state libraries are excluded.

Borrowing costs for individual libraries in the regional network analysis are identical to the estimates made in the analysis of the present system. In the regional system it is assumed that the regional network is so organized that all titles within a region are available to all libraries in the region. Further, it is assumed that titles available in the state but not in the region are available through procedures such as are used in the present system. Estimates based on field studies by the research team have been made of the number of regional unique titles and state unique titles available in each library and are input data to the computer program as shown in Figure F.2. It is assumed that borrowings by libraries are equally distributed over titles available in the state so that the number of regional borrowings filled by loans from within the region is in proportion to the ratio of regional unique titles to total state unique titles. This portion of regional borrowings obtained within the region is allocated to individual lending libraries in the region on the basis of the ratio of regional unique titles held by each library to total unique titles available in the region. The portion of total regional borrowings obtained from libraries outside the region is allocated to individual lending libraries throughout the state in much the same way. Libraries are allocated a share of loans to a region based on the ratio of state-wide unique titles held by that library to total titles available in the state. (Details of the allocation of loans are given in Section F.3 of Appendix F.) Lending costs of each library are the calculated number of loans multiplied by \$1.50.

In the state-wide network borrowing costs for individual libraries are the same as for the present system and the regional network. Loans are prorated to each library on the basis of the ratio of the number of state-wide unique titles held by the library to total unique titles available in the state. Again, lending costs are the number of loans multiplied by \$1.50.

A summary of results obtained from the model for the three configurations is shown in Table 2.7. For each of the three configurations 32,600 borrowings and lendings occur at a cost of \$4.50 per borrow and \$1.50 per loan. Essentially then, costs for the three configurations are identical. Differences in totals in Table 2.7 are due to the method of allocating loans and rounding errors in the program.

The most interesting result obtained from the analysis is the similarity for most libraries between the three system configurations. The number of borrowings and cost of borrowing, of course, is identical for all three configurations. But in addition, the number of loans and loan costs stay much the same except for two libraries, the University of Washington and the Washington State Library. For these libraries there is a shift in loan volume from the Washington State Library to the University of Washington for the regional and state-wide networks. This is due to the method of allocating loans based on unique titles, of which the University of Washington has a much larger number. These calculations are based on current estimated costs and exclude potential hardware and software considerations.

Based on the results of the model, it does not appear that either network configuration would have a significant impact on the flow of interlibrary loans. Essentially, interlibrary loan activity is highly centralized now with only a few libraries doing much of the lending. Adoption of the regional network concept would not be expected to change this much and implementation of the state-wide network concept would only formalize what is now largely the status quo.

TABLE 2.7
TOTAL ANNUAL INTERLIBRARY LOAN COSTS

LIBRARY TYPE	SYSTEM CONFIGURATION		
	PRESENT SYSTEM	REGIONAL NETWORK	STATEWIDE NETWORK
Public Libraries			
Region 1	\$ 5,800	\$ 6,091	\$ 5,920
Region 2	12,654	12,094	11,874
Region 3	6,870	7,146	7,010
Region 4	10,956	9,826	9,464
Region 5	36,138	38,153	39,146
Region 6	12,441	11,086	10,689
Region 7	4,740	5,247	4,913
Region 8	6,362	6,721	6,605
Region 9	9,301	9,591	9,379
Region 10	12,201	13,315	12,774
Region 11	3,135	3,240	3,221
Region 12	5,445	5,800	5,662
State Total	\$126,043	\$128,310	\$126,657
University of Washington	5,645	27,731	31,504
Washington State Univ.	2,665	4,969	5,210
W. Wash. State College	14,400	15,381	14,820
C. Wash. State College	2,812	3,269	3,005
E. Wash. State College	4,050	4,356	4,125
Community Colleges	5,287	5,816	5,606
Washington State Library	34,891	5,277	4,779
TOTALS	\$195,793*	\$195,109*	\$195,706*

*Minor differences can be accounted for by the method of allocating loans and by rounding errors in the computer program.

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CHAPTER 3 TECHNICAL SERVICES

The notion of a centralized technical services operation for otherwise independent libraries can be traced back to 1851 when it was proposed that libraries in the United States organize in definite co-operative enterprise, including cataloging, around the Smithsonian Institution.¹ It was not until recently, however, that the concept of processing centers became a common topic of research and discussion. In the years since 1960 there has been substantial growth in both the study of and establishment of such centers. By and large, the literature has attempted to describe the parameters of operation and design with little reference to details of operational procedures and cost factors.^{2,3} More recently, approaches to procedural and cost questions have been attempted,^{4,5} and mathematical descriptions of the planning and operational phases have been discussed.⁶ Becker and Hayes in their proposed library network for the state briefly discuss the question of a "catalog production center."⁷

Due to time and money constraints, this report concerns itself solely with technical services for books, excluding serials, periodicals, audio-visual materials, etc.

In general, technical services activities can be divided into three major categories:

Acquisitions - All action on the order for a book from the point immediately following the decision to order until the book itself enters the cataloging process. Procedures for payment of invoice are also included.

Cataloging - Activity, both intellectual and clerical, resulting in the actual bibliographic description of a book.

Processing - The mechanical preparation of books to make them ready to be circulated or otherwise used in the library. This includes production of materials such as book pockets, spine labels and catalog cards.

In the remainder of this chapter, technical services activities will be discussed in terms of these major categories.

3.1 Description of Current System

The study included 106 publicly supported libraries with acquisitions in 1969 as shown in Table 3.1. Acquisitions rates varied from less than 100 volumes to more than 100,000 volumes, and operating budgets ranged from slightly over \$100 to several millions of dollars per year. As these numbers indicate, the needs in terms of technical

services vary widely. Data concerning technical services operations were collected both by personal visit and by questionnaire (see Appendix C). In the course of the project 33 libraries were visited, including the two state supported universities, the three state colleges, seven community colleges, and 21 public libraries. The main purpose of these visits was to collect data concerning collection characteristics, but at the same time technical services operations in these libraries were surveyed in an informal manner. The questionnaire was sent to 30 libraries of various types and was primarily intended to collect cost data. Data obtained from the questionnaires are discussed later in this section and tabulated in Tables 3.2 and 3.3.

TABLE 3.1
ACQUISITIONS BY PUBLICLY SUPPORTED LIBRARIES, 1969

TYPE OF LIBRARY*	VOLUMES ACQUIRED	TITLES ACQUIRED
Public libraries	474,878	147,938
University libraries	122,397	48,461
College libraries	48,817	36,820
Community college libraries	82,534	56,618
Washington State Library	14,727	9,732
TOTALS	743,353	299,569

*Acquisitions of individual libraries are shown in Figure F.2 of Appendix F.

There are two major activities in the acquisition function; first, the actual acquiring, i.e. ordering and receipt, and second, the payment to vendor. The method most commonly used by public libraries in performing the first activity is to select titles for purchase from publisher's catalog, review media, advertising, etc. These titles are then ordered individually from the publisher or wholesaler. The second method that libraries use to select materials is to work through approval plans operated by publishers or jobbers. This type of routine is used primarily by academic libraries, and a library usually deals with only one wholesaler. The library makes a selection from a list of criteria describing the type of books it desires. The wholesaler then supplies titles which the library is free to accept or reject.

Details of the second activity, that of payment for items received, are controlled by the method of acquiring items and fiscal requirements of the organization under which the library operates. At one extreme is the situation where each title is ordered on an individual order. When the item is received the cleared order is attached to the appropriate invoice as an approval for payment. At the other end of the scale, all orders are placed originally by the business office for the library's parent organization. In this case, the library requisitions each book and the business office places the orders with a vendor. Upon receipt of the book, the library informs the business office which then arranges for payment of the invoice.

As with acquisitions, details of cataloging vary from library to library as do the content and levels of detail of bibliographic records created in the process. Variations in procedural detail are governed by the ability of the library to perform searches for particular types of information and by the requirements of the library's clientele. For example, in a small library it may be impossible to acquire necessary cataloging tools to be able to catalog a book without help from a central source such as the Library of Congress. However, since this means delay in making the book available, it may be briefly cataloged to make it available as soon as possible. Later, when all catalog data is available, the book may be removed from the collection, the cataloging completed, and the book returned with minimum delay. Variations in level of cataloging also exist. For example, a library which serves a clientele primarily interested in recreational reading does not produce catalog cards which are as detailed as those produced in the major research libraries.

The final step in the technical services operations is production of items which help integrate the book into a collection and identify the book in the catalog. To integrate items into the collection, identifying labels and/or markings are prepared. Book cards and pockets are also produced for the circulation system. For the catalog, either cards are prepared or an entry is made in a book catalog. The libraries in this study almost without exception maintain card rather than book catalogs. The libraries of the state have varied procedures for producing catalog cards. Some hand type all copies of catalog cards, some purchase cataloging source data from the Library of Congress and hand type needed copies, and still others purchase full sets of cards for each item.

Centralization of technical services in the State of Washington is of two types. One is the municipal or district type in which individual libraries are operated as branches of a system from the technical services point of view. Materials are purchased, cataloged, and processed centrally. The second type of centralization is that typified by the relationship between Timberland Regional Library and the Washington State Library. In this case the State Library purchases, catalogs, and processes materials for the regional library. The materials are then delivered to the regional library which distributes them to its branches.

The technical services operation of the Washington State Library differs from operations in other libraries in this survey in two ways. First, it is currently engaged in the production of regularly published book catalogs for two regional libraries in the state and acts as a book processing center for one of those libraries; and second, it, like other divisions of the State Library, has the responsibility for aiding library development on a state-wide basis. Therefore, like the rest of the State Library, its operations are designed to act as experimental models for techniques and methodologies as well as to provide services on a regular basis.

Beginning in 1964, the State Library started compilation and production of a book catalog for the Timberland Library Demonstration (since established as the Timberland Regional Library, a five-county system). Its services included acquisition of materials (but not selection), cataloging and processing, and finally the provision of a book catalog. In the early days, the bibliographic data output of the cataloging operation was converted to machine-readable form via punched card and then the record exploded, sorted, and finally printed in book form beginning with a base catalog and adding supplements. There have been additional cumulations covering materials acquired through 1969.

In the midst of this production, another library system, North Central Regional Library, contracted with the State Library to provide a book catalog for its collection. This service continues with steps accomplished toward combining these catalogs into one master catalog showing holdings of both libraries. Plans are now underway for State Library involvement in the production of book catalogs for the King County Library System (a system with approximately 40 outlets) and The Evergreen State College (new four-year state college due to open in the Fall of 1971.) Many of these advances have been made feasible through the operational status of the Library of Congress' MARC (Machine Readable Cataloging) Project. A description of the MARC Pilot Project is given in a recent paper by Pulsifer on the State Library's participation in the MARC Pilot Project.⁸

To provide a current base for projecting technical services costs for network operations in various configurations, a representative sample of publicly supported libraries was surveyed. The sample consisted of twenty public libraries, five four-year colleges and universities, and five community colleges. Questionnaires were returned by eleven (55%) of the public libraries, four (80%) of the colleges and universities, and five (100%) of the community colleges for a total return of 67%. The questionnaire gathered data sufficient for the purpose stated above. A comprehensive technical services systems analysis - necessary to take into account the unique characteristics of individual libraries and to allow definitive cost comparisons - was not possible within the time limitations of the study. Results of the questionnaire regarding estimated costs of technical services activities are summarized in Table 3.2 and Table 3.3.

3.2 Models of Alternate Systems

Models have been developed to calculate technical services costs for both titles and volumes acquired for each of three configurations; the present system, a regional network (following boundaries suggested in the Becker and Hayes report), and a state-wide network. The computer program developed to perform the necessary calculations is discussed in Appendix F. Input data to the program giving volumes and titles acquired by each library are shown in Appendix Figure F.2.

TABLE 3.2
COST ESTIMATES OF TECHNICAL SERVICES ACTIVITIES - PUBLIC LIBRARIES

LIBRARY	TITLES ACQUIRED	VOLUMES ACQUIRED	ACQUI- TION COSTS	CATALOG- ING COSTS	PROCESS- ING COSTS	ACQUI- TION COSTS/ TITLE	CATALOG- ING COSTS/ TITLE	PROCESS- ING COSTS/ VOLUME
1	179	198	\$ 313	\$ 1,223	\$ 428	\$ 1.746	\$ 6.832	\$ 2.162
2	394	394	148	531	388	0.375	1.348	0.985
3	3,000	3,144	1,536	3,510	2,607	0.512	1.170	0.829
4	3,676	6,769	4,800	7,490	3,233	1.306	2.038	0.478
5	3,918	5,829	3,041	4,013	1,956	0.776	1.024	0.336
6	4,207	13,491	2,174	7,567	10,051	0.512	1.799	0.745
7	5,100	5,400	2,022	6,534	3,019	0.396	1.281	0.559
8	5,652	11,413	2,688	7,809	6,966	0.476	1.382	0.610
9	6,009	21,134	19,526	16,984	13,769	3.249	2.826	0.652
10	6,200	7,219	5,480	15,971	5,920	0.884	2.576	0.820
11	11,305	77,100	48,147	57,961	25,703	4.259	5.127	0.333
AVERAGE	4,513	13,826	\$ 8,170	\$11,781	\$ 6,731	\$ 1.810	\$ 2.611	\$ 0.487
MEDIAN	4,207	6,769	\$ 2,688	\$ 7,490	\$ 3,233	\$ 0.884	\$ 2.038	\$ 0.745

TABLE 3.3
COST ESTIMATES OF TECHNICAL SERVICES ACTIVITIES - ACADEMIC LIBRARIES

LIBRARY	TITLES ACQUIRED	VOLUMES ACQUIRED	ACQUISITION COSTS	CATALOG- ING COSTS	PROCESS- ING COSTS	ACQUISITION COSTS/ TITLE	CATALOG- ING COSTS/ TITLE	PROCESS- ING COSTS/ VOLUME
COMMUNITY COLLEGES:								
1	1,450	1,500	\$ 2,716	\$ 8,225	\$ 3,730	\$ 1.873	\$ 5.672	\$ 2.487
2	3,000	4,000	1,391	14,282	7,104	0.464	4.761	1.766
3	3,281	3,281	4,890	6,472	3,264	1.490	1.973	0.995
4	4,801	5,854	19,158	27,201	8,255	3.990	5.666	1.410
5	5,045	6,545	11,531	6,054*	5,231	2.286	1.200	0.799
AVERAGE	3,515	4,236	\$ 7,937	\$ 12,446	\$ 5,516	\$ 2.258	\$ 3.541	\$ 1.302
MEDIAN	3,281	4,000	\$ 4,890	\$ 8,225	\$ 5,231	\$ 1.873	\$ 4.761	\$ 1.410
FOUR-YEAR COLLEGES & UNIVERSITIES:								
1	13,000	13,982	\$ 25,064	\$ 50,518	\$ 7,079	\$ 1.928	\$ 3.886	\$ 0.506
2	16,000	16,393	38,284	47,130	15,936	2.393	2.946	0.972
3	19,541	23,278	26,043	67,328	36,569	1.333	3.445	1.571
4	38,375	84,591	101,486	114,048	30,555	2.645	2.972	0.361
AVERAGE	21,729	34,561	\$ 47,719	\$ 69,756	\$ 22,534	\$ 2.196	\$ 3.210	\$ 0.652
MEDIAN	17,771	19,836	\$ 32,164	\$ 58,923	\$ 23,246	\$ 2.161	\$ 3.429	\$ 0.739

* This dollar figure is the product of \$1.20 times the number of titles acquired since, according to the questionnaire, this institution buys all titles precataloged at the above per title cost.

For the present system, technical services costs for each library are the sum of volume processing costs and title processing costs (made up of acquisition costs plus cataloging costs). Volume processing costs are estimated to be \$.60 per volume, regardless of library type. Title processing costs are estimated to be \$5.00 per title (\$2.00 acquisition cost plus \$3.00 cataloging cost) regardless of library type. These estimates are based on data shown in Tables 3.2 and 3.3. For example, the total costs for a one-volume work would be \$5.60 (\$5.00 title processing cost plus \$.60 volume processing cost). For a two-volume work or two copies of the same title, the costs would be \$6.20 (\$5.00 title processing plus \$.60 volume processing for first volume or copy plus \$.60 volume processing for second volume or copy).

The regional and state-wide network calculations make use of the concept of regional unique titles and state-wide unique titles in each library. These are data which are input to the program and are shown in Figure F.2. Estimates of unique titles are based on the study made by the research team of overlap between collections which is discussed in Appendix A of this report. Regional unique titles for each library in a region are found by estimating the number of titles in the largest library in the region, using the overlap data to estimate additional unique titles in the second largest library and following this procedure on down to the smallest library in the region. For state-wide unique titles the same procedure is used, but the process starts with the largest library in the state and works down to the smallest in the state.

Volume processing costs for each library in the regional network are estimated to be \$.60 per volume as in the present system. Costs to process a title are estimated to be an acquisition cost of \$2.00 per title plus a share of cataloging costs in the region, on the assumption that cataloging would be shared in the region through the network. The average amount of cataloging per title acquired in the region is the ratio of total regional unique titles to the sum of titles in individual libraries in the region, and this ratio is multiplied by \$3.00 to find average cataloging cost per title acquired for each library in the region. No attempt is made to determine the specific library performing the cataloging. Instead, average costs are prorated to all libraries in the region. The \$2.00 and \$3.00 cost estimates used above are once more based on the approximately level of costs shown in Tables 3.2 and 3.3.

In the state-wide network volume processing costs are the same as in the present system and regional network configurations. Costs to process a title are estimated to be an acquisition cost of \$2.00 per title plus a share of cataloging costs in the state, on the assumption that cataloging would be shared state-wide through the network. The average amount of cataloging per title acquired in the state is the ratio of total unique titles in the state to the sum of titles in individual libraries in the state. This ratio is multiplied by \$3.00 to find average cataloging costs per title acquired. No attempt is made to determine the specific library performing the cataloging.

A summary of results obtained from the model for the three-system configurations is shown in Table 3.4. Care should be used in interpreting the table since it reflects only average costs for each system and does not reflect actual costs to the specific libraries that would do the cataloging in the regional and state-wide networks. Also, communications costs and possible changes in costs of performing these activities in the regional and state-wide systems are not considered. These are discussed later in the report. The analysis does show, however, that there are potential savings through sharing of cataloging of approximately \$325,000 under the regional network plan and approximately \$680,000 per year under the state-wide network plan.

TABLE 3.4
ESTIMATES OF TOTAL ANNUAL TECHNICAL SERVICES COSTS

LIBRARY TYPE	SYSTEM CONFIGURATION		
	PRESENT SYSTEM	REGIONAL NETWORK	STATE-WIDE NETWORK
Public Libraries:			
Region 1	\$ 60,629	\$ 49,769	\$ 38,742
Region 2	53,712	45,821	37,072
Region 3	56,878	43,120	35,696
Region 4	117,149	99,207	78,237
Region 5	262,004	234,959	196,994
Region 6	84,176	72,522	54,210
Region 7	72,658	53,745	44,088
Region 8	59,078	47,528	36,864
Region 9	30,251	27,833	22,502
Region 10	113,660	93,369	72,545
Region 11	35,328	32,236	21,326
Region 12	79,653	60,274	50,826
State Total	\$1,024,586	\$ 860,383	\$ 689,102
University of Washington	226,061	192,963	146,495
Washington State University	89,682	82,990	59,363
Western Washington State College	127,108	94,254	76,933
Central Washington State College	72,260	57,743	44,338
Eastern Washington State College	14,021	11,360	8,628
Community Colleges	332,603	271,304	204,212
Washington State Library	57,496	47,033	35,428
TOTALS	\$1,943,817	\$1,618,030	\$1,264,499

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CHAPTER 4

COLLECTION MANAGEMENT

This chapter is concerned with library resources available in the state, the degree to which these resources are duplicated between libraries and the frequency of use of these materials by library patrons. This general area of concern has been designated "collection management." Because of time and budget limitations, the study has been restricted to book holdings and book circulations only. While periodical and audio-visual materials are also of major importance, an analysis focused on books should provide an indication of general resource and service patterns. Union lists of periodicals are now being compiled, as is a state-wide directory of audio-visual holdings, and these should provide additional relevant data when they become available.

4.1 Description of Current Book Holdings and Usage

Data on book collections were developed from available statistical data and through visits of members of the research team to libraries within the state. Table 4.1 provides a general picture of relative subject strength in the ten largest libraries in the state. Titles, not volumes, are shown because of the wide variation in volume to title ratios which are characteristic of libraries. For example, the collections of King County, the University of Washington and the Washington State Library have estimated volume to title ratios of 8.3 to 1, 2.4 to 1, and 1.4 to 1 respectively. To compare libraries with different classification schemes, a computer program was developed which analyzed MARC II cataloging data. This allowed researchers to construct a translation table between the Library of Congress classification and the Dewey Decimal classification. The results of the program are discussed further in Appendix A.

Table 4.2 compares the percent of holdings in Dewey Decimal classifications versus percent of circulations in these classifications. The data are presented for six libraries in the state for which holdings and circulations could be matched in a reasonably consistent manner.

To determine the degree to which library book collections duplicate each other, a sample of recently published titles was selected and checked against holdings of libraries in the state. Details of the study are given in Appendix A. In general, the study involved the selection of 500 titles from the 1968 monthly issues of the American Book Publishing Record and searching them against holdings in 33 libraries throughout the state. Table 4.3 summarizes the results of the study. 438 of the sample titles were located in the 33 libraries. Extrapolating from this sample, it is estimated that 88% or 24,400 titles published in 1968 are available in these libraries. Allowing for some retrospective purchasing and additional titles in the libraries not searched, it is estimated that approximately 90% of currently published American titles are purchased by the state's libraries.

TABLE 4.1
BOOK HOLDINGS OF THE LARGEST LIBRARIES
ADULT ONLY -- LC CLASSIFIED TITLES HAVE BEEN TRANSLATED TO DDC

Library	000's	100's	200's	300's	400's	500's	600's	700's	800's	900's	Biog (B,920)	Fiction	Total Titles
University of Washington	18,875	23,016	18,384	146,187	14,178	80,228	103,036	55,292	137,730 ¹	82,842 ²	28,973 ²	--	708,741
Seattle Public Library	7,784	10,298	11,141	59,135	4,221	27,439 ³	52,148	50,584	27,984	45,732	26,703	33,131	356,300
Wash. State University	7,345	7,235	10,012	62,904	4,929	29,165	39,685	21,050	56,739 ¹	39,580 ²	4,455 ²	--	283,099
Washington State Library	5,560	6,130	4,860	36,560	1,780	9,610	30,290	15,810	11,920	11,240	7,830	4,480 ⁴	146,070
Spokane Public Library	3,327	2,201	3,078	14,103	1,165	5,249	14,093	13,735	10,717	20,856	7,968	29,990	126,482
Western Washington St. Coll.	5,237	5,042	4,416	32,501	1,707	11,885	9,718	9,927	23,113 ¹	16,472 ⁵	--	--	120,018
Tacoma Public Library	2,340	2,823	3,403	17,052	1,375	6,263	13,968	16,792	11,509	18,211	7,437	18,449	119,622
Central Washington St. Coll.	4,628	2,728	4,941	31,966	1,664	11,454	9,540	11,102	18,395 ¹	13,545 ⁵	--	--	109,963
Eastern Washington St. Coll.	1,892	3,726	1,936	22,650	1,328	7,489	7,665	6,859	13,152 ¹	14,850	6,735	--	88,282
King County Regional Lib.	1,257	2,060	1,857	8,133	619	4,477	7,107	9,109	6,682	10,598	6,672	22,657	81,228

1. Includes Fiction.
2. Biography vs. 900's reflects DDC proportions.
3. Includes Aeronautics, usually classed in 600's.
4. Purchase of Fiction is a rarity.
5. Biography included.

TABLE 4.2
HOLDINGS VERSUS CIRCULATION BY DEWEY CLASSIFICATION FOR SELECTED LIBRARIES

DEWEY CLASSIFI- CATION	WASHINGTON				SEATTLE PUBLIC				TACOMA PUBLIC				WASHINGTON STATE UNIVERSITY				WESTERN WASHINGTON STATE COLLEGE				EASTERN WASHINGTON STATE COLLEGE			
	PERCENT HOLDINGS	PERCENT CIRC.	PERCENT HOLDINGS	PERCENT CIRC.*	PERCENT HOLDINGS	PERCENT CIRC.*	PERCENT HOLDINGS	PERCENT CIRC.*	PERCENT HOLDINGS	PERCENT CIRC.*	PERCENT HOLDINGS	PERCENT CIRC.*	PERCENT HOLDINGS	PERCENT CIRC.	PERCENT HOLDINGS	PERCENT CIRC.	PERCENT HOLDINGS	PERCENT CIRC.	PERCENT HOLDINGS	PERCENT CIRC.	PERCENT HOLDINGS	PERCENT CIRC.	PERCENT HOLDINGS	PERCENT CIRC.
600's	3.8	1.4	2.2	.3	1.9	.2	2.6	1.2	4.4	1.2	2.1	.4	1.2	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
100's	4.2	8.4	2.9	5.1	2.4	2.2	2.5	5.5	4.2	9.1	4.2	6.1	9.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
200's	3.3	2.1	3.1	2.1	2.8	1.5	3.7	3.8	3.7	3.1	2.2	2.0	3.1	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2
300's	25.0	27.8	16.6	9.8	14.3	11.7	22.2	27.9	27.1	33.8	25.7	27.6	33.8	25.7	27.1	33.8	25.7	27.1	33.8	25.7	27.1	33.8	25.7	27.6
400's	1.2	1.0	1.2	.6	1.2	.4	1.7	1.1	1.4	.7	1.5	.3	1.1	.7	1.4	.7	1.5	.3	1.1	.7	1.4	.7	1.5	.3
500's	6.6	5.4	7.7	5.1	5.2	2.4	10.3	6.8	9.9	11.2	8.5	8.3	11.2	8.5	9.9	11.2	8.5	8.3	11.2	8.5	9.9	11.2	8.5	8.3
600's	20.7	22.6	14.6	11.3	11.7	8.9	14.0	11.1	8.1	7.2	8.7	13.2	11.1	7.2	8.1	7.2	8.7	13.2	11.1	7.2	8.1	7.2	8.7	13.2
700's	10.8	13.7	14.2	13.3	14.0	8.3	7.4	8.0	8.3	9.8	7.8	12.2	8.0	9.8	8.3	9.8	7.8	12.2	8.0	9.8	8.3	9.8	7.8	12.2
800's	8.2	5.5	7.9	6.2	9.6	6.9	20.0	20.0	19.2	6.3	14.9	14.4	20.0	20.0	19.2	6.3	14.9	14.4	20.0	20.0	19.2	6.3	14.9	14.4
900's	7.7	6.7	12.7	8.4	15.2	12.1	14.0	13.9	13.7	17.6	24.4	15.5	14.0	13.9	13.7	17.6	24.4	15.5	14.0	13.9	13.7	17.6	24.4	15.5
Biography	5.4	2.6	7.5	4.7	6.2	4.7	1.6	.6	**		**		.6	**	**		**		**		**		**	
Fiction	3.1	2.8	9.4	33.1	15.5	40.7	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***	***
TOTALS	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

* Adult circulation only.

** Biography included in 900's.

*** Fiction included in 800's.

TABLE 4.3
CUMULATION OF DIFFERENT TITLES FOUND
1968 SAMPLE OF 500 TITLES PUBLISHED

NO.	LIBRARY	TITLES FOUND	DIFFERENT TITLES ADDED	CUMULATED TITLES ADDED	CUMULATED PERCENTAGE
1	Washington State Univ.	209	209	209	47.72
2	West. Wash. St. Coll.	198	53	262	59.82
3	Univ. of Washington	191	41	303	69.18
4	Seattle Public	183	66	369	84.25
5	Cent. Wash. St. Coll.	172	9	378	86.30
6	Washington State Lib.	139	16	394	89.95
7	Tacoma Public	120	14	408	93.15
8	King County	112	8	416	94.98
9	Pierce County	107	4	420	95.89
10	Spokane Public	107	4	424	96.80
11	Spokane County	90	5	429	97.95
12	Longview Public	87	0	429	97.95
13	Sno-Isle Regional	87	0	429	97.95
14	Yakima Valley Regional	86	2	431	98.40
15	Timberland Regional	79	1	432	98.63
16	Bellingham Public	68	0	432	98.63
17	Everett Public	67	1	433	98.86
18	Richland Public	64	0	433	98.86
19	Fort Vancouver Regional	62	0	433	98.86
20	Kitsap County Regional	62	0	433	98.86
21	Seattle Community Coll.	62	0	433	98.86
22	Mid-Columbia Regional	59	2	435	99.32
23	Tacoma Community Coll.	55	1	436	99.54
24	Shoreline Community Coll.	54	0	436	99.54
25	Walla Walla Public	52	2	438	100.00
26	East. Wash. St. Coll.	45	0	438	100.00
27	North Central Regional	42	0	438	100.00
28	Puyallup Public	23	0	438	100.00
29	Whatcom County Regional	17	0	438	100.00
30	Yakima Valley Regional	17	0	438	100.00
31	Everett Comm. Coll.	16	0	438	100.00
32	Green River Comm. Coll.	11	0	438	100.00
33	Centralia Comm. Coll.	7	0	438	100.00
TOTALS		2,750	438	438	100.00

Since no one library purchased more than 42% of the available titles, there is considerable potential benefit to be derived from the cooperative purchase and use of books acquired in the state.

A complete analysis of age of the collections by Dewey Decimal classification for the Washington State Library and Seattle Public Library is presented in Appendix Table A.8. Table 4.4 shows a summary of the age distribution of book holdings by subject for these two libraries. Appendix Table B.3 gives a complete analysis by Dewey Decimal classification of the age distribution of books circulated in the Washington State Library and Seattle Public Library during January 1970. Table 4.5 shows a summary of the age distribution of books circulated for all classifications for these two libraries. Figure 4.1 shows the comparison between distribution of holdings and distribution of circulation by age for the Washington State Library, and Figure 4.2 shows the same data for the Seattle Public Library. Both Figures 4.1 and 4.2 indicate a considerable difference between the age distribution of book holdings and age distribution of circulation. Circulations are much more concentrated in recent books than are holdings. This is more striking in the case of the Seattle Public Library which has the older collection.

The availability of circulation records in machine readable form at Central Washington State College permitted a computer analysis of that library's circulation for an 18-month period. During that period 75,400 circulations of 30,900 titles were recorded. A summary of results of the analysis is shown in Table 4.6 and further details are given in Appendix B. Machine readable circulation records were also available from the Bellingham Public Library for a 3-month period. Table 4.7 provides an analysis of these circulations. The data base consisted of 111,800 circulations of 34,700 titles. For both libraries the majority of titles did not circulate during the period of study. For Central Washington 33% circulated in 18 months; for Bellingham 39% circulated in 3 months. A similar situation was found at the Washington State Library where 66% of a sample of 1,490 titles did not circulate in 1969. Complete results of the study at the Washington State Library are tabulated in Appendix B. Tables 4.8 and 4.9 show the frequency of circulation for all titles in the Central Washington Library and the Bellingham Public Library respectively. The very high proportion of titles which did not circulate or circulated infrequently is evident. Use of books within the library is excluded from the statistics above since no records are available.

4.2 Models of Alternate Systems

Data presented in the preceding section, particularly as it relates to overlap between collections and frequency of circulation, suggest that there may be possibilities for improved effectiveness and use of resources through cooperative interlibrary management of collections.

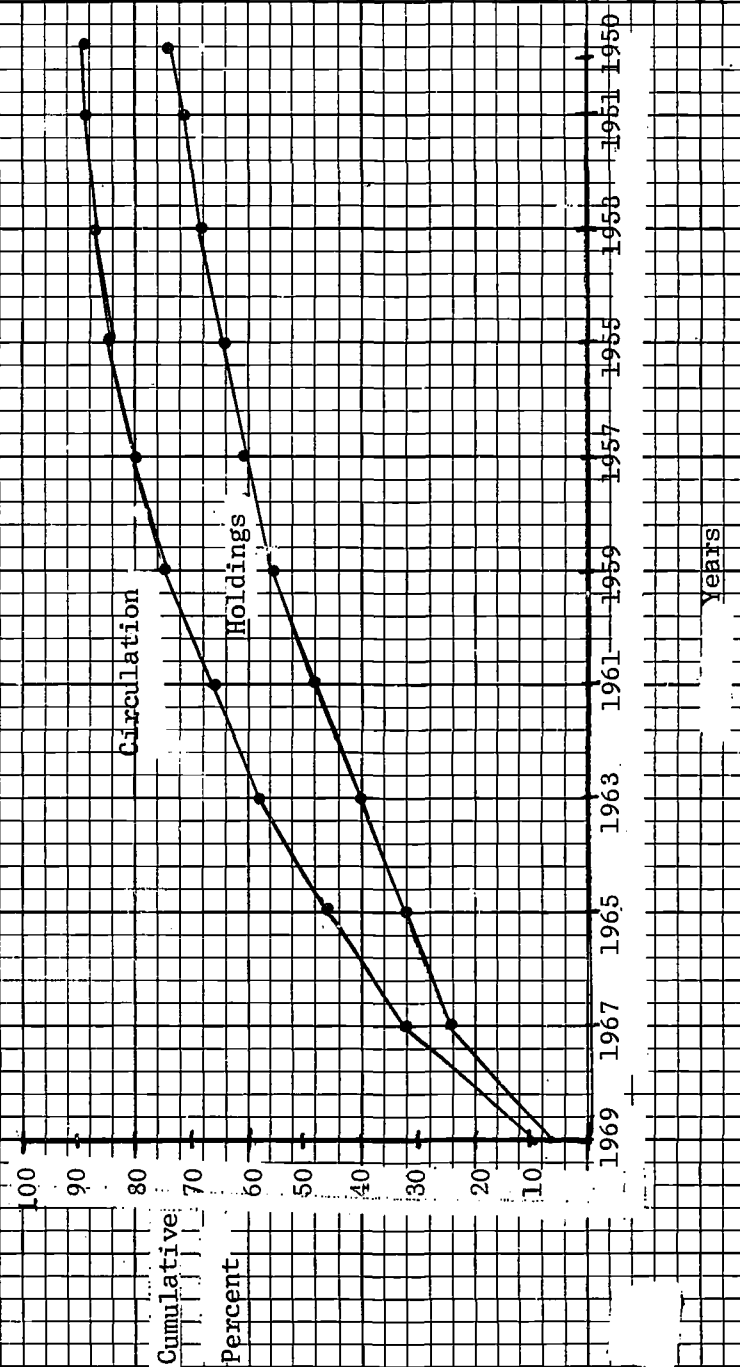
TABLE 4.4
AGE DISTRIBUTION OF BOOK HOLDINGS

YEAR OF PUBLICATION	WASHINGTON STATE LIBRARY		SEATTLE PUBLIC LIBRARY	
	PERCENT	CUMULATIVE PERCENT	PERCENT	CUMULATIVE PERCENT
1969	5.5	5.5	4.0	4.0
1968	9.5	15.0	6.5	10.5
1967	9.1	24.1	4.6	15.1
1966	4.8	28.9	3.5	18.6
1965	3.8	32.7	5.1	23.7
1964	3.9	36.5	2.9	26.6
1963	4.2	40.7	3.1	29.6
1962	3.8	44.6	1.7	31.3
1961	4.1	48.7	2.7	34.0
1960	4.1	52.8	2.2	36.2
1959	3.2	56.0	1.6	37.8
1958	2.3	58.3	3.2	40.9
1957	2.3	60.6	1.0	41.9
1956	2.3	62.8	2.6	44.5
1955	2.3	65.1	1.0	45.5
1954	1.9	67.0	1.0	46.6
1953	1.8	68.8	1.7	48.2
1952	1.7	70.5	1.3	49.5
1951	1.1	71.6	1.4	50.9
1950	1.2	72.8	1.2	52.1
Before 1950	27.2	100.0	47.9	100.0

TABLE 4.5
AGE DISTRIBUTION OF BOOK CIRCULATIONS
JANUARY 1970

YEAR OF PUBLICATION	WASHINGTON STATE LIBRARY		SEATTLE PUBLIC LIBRARY	
	PERCENT	CUMULATIVE PERCENT	PERCENT	CUMULATIVE PERCENT
1969	9.6	9.6	10.4	10.4
1968	13.2	22.8	10.2	20.6
1967	9.8	32.6	7.8	28.4
1966	6.8	39.4	6.3	34.8
1965	7.2	46.6	7.2	41.9
1964	4.7	51.3	7.0	49.0
1963	6.7	58.0	5.6	54.5
1962	4.8	62.8	4.3	58.9
1961	3.9	66.7	4.4	63.3
1960	5.6	72.3	3.5	66.7
1959	3.2	75.5	2.6	69.3
1958	2.4	77.9	3.2	72.5
1957	2.4	80.3	2.7	75.2
1956	2.3	82.5	1.9	77.1
1955	1.8	84.3	2.2	79.3
1954	1.6	85.9	2.0	81.3
1953	.7	86.6	1.7	83.0
1952	1.6	88.1	1.3	84.3
1951	.7	88.8	1.0	85.3
1950	.7	89.5	1.0	86.4
Before 1950	10.5	100.0	13.6	100.0

FIGURE 4.1
HOLDINGS VERSUS CIRCULATION BY AGE FOR WASHINGTON STATE LIBRARY
(From Tables 4.4 and 4.5)



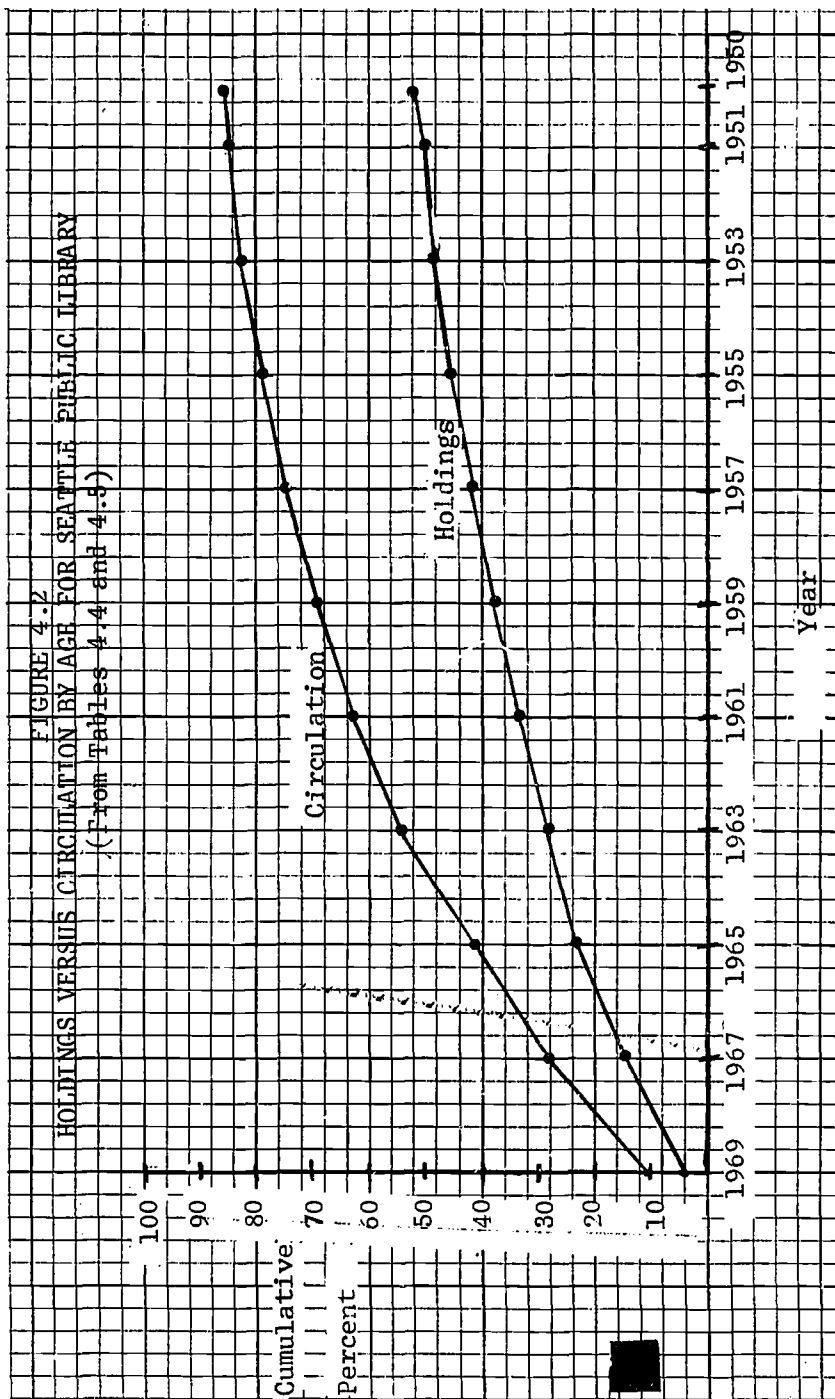


TABLE 4.6
ANALYSIS BY SUBJECT OF BOOK CIRCULATIONS
CENTRAL WASHINGTON STATE COLLEGE
(January 2, 1968 - June 30, 1969)

SUBJECT CLASS	TITLES AVAILABLE	TITLES WHICH CIRCULATED	% OF TITLES CIRCULATED	CIRCULATION
A	917	25	2.5	47
B	6,215	2,876	46.3	8,095
C	505	182	36.1	325
D	7,728	3,010	39.0	6,834
E	3,555	1,313	37.5	2,741
F	2,905	819	28.2	1,490
G	2,519	1,096	43.6	2,770
H	12,558	5,053	40.3	14,743
J	3,134	921	29.4	1,974
K	642	98	15.3	176
L	8,278	2,765	33.4	8,574
M	3,340	632	18.9	1,362
N	3,868	1,788	46.2	4,596
P	19,413	4,576	23.6	8,741
Q	10,188	2,748	27.0	6,126
R	12,049	884	43.1	2,197
S	620	294	47.4	661
T	3,020	1,215	40.2	2,770
U	199	132	66.4	259
V	42	21	50.0	37
Z	3,274	428	13.1	847
TOTALS	94,969	30,876	32.6%	75,365

TABLE 4.7
ANALYSIS BY SUBJECT OF BOOK CIRCULATIONS
BELLINGHAM PUBLIC LIBRARY
(January 1, 1970 - March 31, 1970)

SUBJECT CLASS	TITLES AVAILABLE	TITLES WHICH CIRCULATED	% OF TITLES CIRCULATED	CIRCULATION
000's	731	412	56.4	595
100's	1,373	777	56.5	2,358
200's	2,141	843	39.3	1,640
300's	7,823	3,157	40.4	7,522
400's	697	178	25.6	379
500's	4,822	1,704	35.4	4,218
600's	8,586	4,558	53.3	12,515
700's	6,899	3,401	49.4	8,833
800's	8,177	2,529	30.9	4,594
900's	19,421	5,352	27.6	12,918
Fiction	28,099	11,813	42.1	56,311
TOTALS	88,769	34,724	39.1%	111,833

TABLE 4.8
FREQUENCY OF CIRCULATION OF TITLES
CENTRAL WASHINGTON STATE COLLEGE
(January 2, 1968 - June 30, 1969)

NO. OF TIMES CIRCULATED	NO. OF TITLES	PERCENT	CUMULATIVE PERCENT
0	64,093	67.49	
1	14,225	14.98	82.47
2	6,871	7.23	89.70
3	3,720	3.92	93.62
4	2,140	2.25	95.87
5	1,335	1.41	97.28
6	849	0.89	98.17
7	541	0.57	98.74
8	359	0.38	99.12
9	237	0.25	99.37
10	139	0.15	99.52
11	113	0.12	99.64
12	98	0.10	99.74
13	54	0.06	99.80
14	42	0.04	99.84
15	28	0.03	99.87
16	21	0.02	99.89
17	18	0.02	99.91
18	17	0.02	99.93
19	8	0.01	99.94
20	5	0.01	99.95
21	5	0.01	99.96
22	9	0.01	99.97
23	1	0.00	99.97
24	3	0.00	99.97
25 or more	38	0.04	100.04
TOTAL	94,969	100.01	

TABLE 4.9
FREQUENCY OF CIRCULATION OF TITLES
BELLINGHAM PUBLIC LIBRARY
(January 1, 1970 - March 31, 1970)

NO. OF TIMES CIRCULATED	NO. OF TITLES	PERCENT	CUMULATIVE PERCENT
0	54,045	60.88	
1	12,618	14.21	75.09
2	7,642	8.61	83.70
3	4,827	5.44	89.14
4	2,952	3.33	92.47
5	1,892	2.13	94.60
6	1,221	1.38	95.98
7	861	0.97	96.95
8	593	0.67	97.62
9	419	0.47	98.09
10	348	0.39	98.48
11	268	0.30	98.78
12	170	0.19	98.97
13	153	0.17	99.14
14	120	0.14	99.28
15	89	0.10	99.38
16	84	0.09	99.47
17	71	0.08	99.55
18	49	0.06	99.61
19	49	0.06	99.67
20	48	0.05	99.72
21	36	0.04	99.76
22	30	0.03	99.79
23	26	0.03	99.82
24	17	0.02	99.84
25 or more	141	0.16	100.00
TOTALS	88,769	100.00	

Discussion here will be limited to some of the economic effects of interregional and state-wide collection management. In other words, estimates will be made of the fiscal advantages to be obtained if libraries were to cooperate in collection acquisition and management without exploring the details of how such cooperation could be effected. Two of many possible advantages of this cooperation are costed:

- a. Storing centrally seldom used books.
- b. Avoidance of purchasing duplicate copies of seldom used books.

Since data available concerning both matters are very sketchy, only general estimates can be made.

4.2.1 A Central Store for Seldom Used Books

Calculations here involve computing the cost of maintaining low circulation volumes under each of three systems; the present system, a regional network following boundaries suggested in the Becker and Hayes report,¹ and a state-wide network. Low circulation volumes are defined as those having circulation rates of less than one per year. As suggested by Locke,² maintenance costs are estimated to be \$.20 per volume per year. No distinction is made in costs between the three configurations or for the different types of libraries.

The computer program developed to perform the calculations is discussed in Appendix F. Input data to the program giving titles, regional unique titles, and state unique titles for each library are shown in Figure F.2.

For the present system low circulation volumes are estimated to be 50% of titles in each library. The 50% is based on data presented in the preceding section and is intended only to permit establishment of the general magnitude of costs involved. Costs for each library are the number of low circulation volumes multiplied by the \$.20 per year maintenance cost.

In the regional network calculation it is assumed that low circulation volumes are maintained only in one location in the region and that these volumes are shared by all libraries in the region. The number of low circulation volumes maintained in these single locations is estimated to be 50% of regional unique titles in each library. Costs of maintenance, again, are \$.20 per volume.

For the state-wide network, it is assumed that low circulation volumes are maintained only in one location and that these volumes are shared by all libraries in the state. The number of low circulation

volumes maintained in these single locations is estimated to be 50% of state-wide unique titles in each library. Maintenance costs are \$.20 per volume.

A summary of cost by type of library for the three system configurations is given in Table 4.10. Because of the nature of the calculation, the totals shown should be considered to indicate only the magnitude of likely cost changes. Further development of data and the estimation procedure would allow much more confidence to be placed in the results. The program calculates low circulation maintenance costs for all three configurations on the basis of titles currently in each library. Since it is likely that low circulation volumes would be centralized under the regional and state-wide configurations, actual costs would be distributed somewhat differently than shown by the program although total costs would remain the same. As shown in Table 4.10, potential savings are possible of \$165,000 per year if a regional network is adopted and \$350,000 if a state-wide network is adopted.

4.2.2 Avoidance of Purchasing Duplicate Copies of Seldom Used Books

Available data are so scanty, estimates must be very conservative. Tables in this chapter and Appendix B provide the following:

- a. Central Washington State College Library. 67% of available book titles did not circulate in an 18-month period.
- b. Bellingham Public Library. 61% of available book titles did not circulate in a 3-month period.
- c. Washington State Library. 66% of a sample of available book titles did not circulate in 1969. 70% of a sample of available book titles did not circulate in 1968. 69% of a sample of available titles did not circulate during the first year after publication.

With circulation rates per available volume considerably greater in public libraries than in academic and research libraries, a conservative estimate is that 20% of titles purchased do not circulate within one year after their addition to the average library.

Cooperative acquisition programs at either the network regional or state levels would identify and defer purchase of all duplicate copies of potentially low circulating volumes (less than one projected circulation in the first year after addition). One copy of these low circulating titles would be available within the geographic bounds of the cooperating libraries.

Table 4.11 shows the cost of purchasing low circulation volumes within each of three system configurations. An average volume to title ratio of 1:1 is used. The average cost of a volume is estimated

TABLE 4.10
TOTAL ANNUAL LOW CIRCULATION VOLUME MAINTENANCE COSTS

LIBRARY TYPE	SYSTEM CONFIGURATION		
	PRESENT SYSTEM	REGIONAL NETWORK	STATE-WIDE NETWORK
Public Libraries:			
Region 1	\$15,340	\$10,291	\$ 285
Region 2	14,788	6,197	464
Region 3	18,722	9,753	342
Region 4	25,759	18,073	1,078
Region 5	57,990	23,702	21,615
Region 6	19,587	14,610	479
Region 7	25,651	7,715	420
Region 8	17,318	7,187	566
Region 9	9,507	8,140	184
Region 10	33,268	20,739	3,609
Region 11	11,090	4,517	208
Region 12	26,852	13,090	508
STATE TOTAL	\$275,872	\$144,014	\$ 29,758
University of Washington	70,914	70,914	70,914
Washington State University	28,305	28,305	8,126
Western Washington State College	12,001	12,001	969
Central Washington State College	11,000	11,000	447
Eastern Washington State College	8,736	5,630	174
Community Colleges	40,836	12,343	77½
Washington State Library	14,607	14,607	1,681
TOTALS	\$462,271	\$298,814	\$112,843

volumes maintained in these single locations is estimated to be 50% of state-wide unique titles in each library. Maintenance costs are \$.20 per volume.

A summary of cost by type of library for the three system configurations is given in Table 4.10. Because of the nature of the calculation, the totals shown should be considered to indicate only the magnitude of likely cost changes. Further development of data and the estimation procedure would allow much more confidence to be placed in the results. The program calculates low circulation maintenance costs for all three configurations on the basis of titles currently in each library. Since it is likely that low circulation volumes would be centralized under the regional and state-wide configurations, actual costs would be distributed somewhat differently than shown by the program although total costs would remain the same. As shown in Table 4.10, potential savings are possible of \$165,000 per year if a regional network is adopted and \$350,000 if a state-wide network is adopted.

4.2.2 Avoidance of Purchasing Duplicate Copies of Seldom Used Books

Available data are so scanty, estimates must be very conservative. Tables in this chapter and Appendix B provide the following:

- a. Central Washington State College Library. 67% of available book titles did not circulate in an 18-month period.
- b. Bellingham Public Library. 61% of available book titles did not circulate in a 3-month period.
- c. Washington State Library. 66% of a sample of available book titles did not circulate in 1969. 70% of a sample of available book titles did not circulate in 1968. 69% of a sample of available titles did not circulate during the first year after publication.

With circulation rates per available volume considerably greater in public libraries than in academic and research libraries, a conservative estimate is that 20% of titles purchased do not circulate within one year after their addition to the average library.

Cooperative acquisition programs at either the network regional or state levels would identify and defer purchase of all duplicate copies of potentially low circulating volumes (less than one projected circulation in the first year after addition). One copy of these low circulating titles would be available within the geographic bounds of the cooperating libraries.

Table 4.11 shows the cost of purchasing low circulation volumes within each of three system configurations. An average volume to title ratio of 1:1 is used. The average cost of a volume is estimated

TABLE 4.10
TOTAL ANNUAL LOW CIRCULATION VOLUME MAINTENANCE COSTS

LIBRARY TYPE	SYSTEM CONFIGURATION		
	PRESENT SYSTEM	REGIONAL NETWORK	STATE-WIDE NETWORK
Public Libraries:			
Region 1	\$15,340	\$10,291	\$ 285
Region 2	14,788	6,197	464
Region 3	18,722	9,753	342
Region 4	25,759	18,073	1,078
Region 5	57,990	23,702	21,615
Region 6	19,587	14,610	479
Region 7	25,651	7,715	420
Region 8	17,318	7,187	566
Region 9	9,507	8,140	184
Region 10	33,268	20,739	3,609
Region 11	11,090	4,517	208
Region 12	26,852	13,090	508
STATE TOTAL	\$275,872	\$144,014	\$ 29,758
University of Washington	70,914	70,914	70,914
Washington State University	28,305	28,305	8,126
Western Washington State College	12,001	12,001	969
Central Washington State College	11,000	11,000	447
Eastern Washington State College	8,736	5,630	174
Community Colleges	40,836	12,343	774
Washington State Library	14,607	14,607	1,681
TOTALS	\$462,271	\$298,814	\$112,843

TABLE 4.11
TOTAL ANNUAL LOW CIRCULATION VOLUME PURCHASE COSTS

ALL TYPES OF LIBRARIES BY REGION	SYSTEM CONFIGURATION		
	PRESENT SYSTEM	REGIONAL NETWORK	STATE-WIDE NETWORK
Region 1	\$ 10,762	\$ 6,727	\$ 196
Region 2	16,595	10,649	1,110
Region 3	9,248	4,708	158
Region 4	19,754	12,869	800
Region 5	65,155	44,670	43,230
Region 6	12,428	8,775	291
Region 7	28,646	14,469	1,037
Region 8	19,138	11,617	666
Region 9	7,261	5,550	123
Region 10	18,483	11,591	1,602
Region 11	15,635	13,028	3,309
Region 12	16,549	8,140	300
TOTALS	\$239,655	\$152,793	\$52,822

at \$4.00. Present system costs are established as the product of \$4.00 times 20% of the number of titles added to libraries within each region during 1969. Regional network costs are similarly calculated except that the costs of the low circulating titles within the region are eliminated. State-wide costs are likewise calculated but with the elimination of the costs of all low circulating duplicate copies within the state. These calculations were done by hand rather than by computer program because of time constraints.

As was the case of maintenance costs, actual costs would probably be distributed somewhat differently from the estimates but total costs would remain the same. The projections of Table 4.11 show potential savings of \$87,000 if a regional network is adopted and \$187,000 per year if a state-wide network is adopted.

4.2.3 Costs of Alternate Systems

Table 4.12 shows and sums the costs discussed in the two preceding sections. Potential savings in the form of released resources approximate \$250,000 per year under regional networking and \$536,000 per year under state-wide networking. Again, the figures indicate the magnitude of likely cost changes and are presented to illustrate the potential cost-effectiveness of the alternate system configurations.

TABLE 4.12
TOTAL ANNUAL LOW CIRCULATION VOLUME MAINTENANCE AND PURCHASE COSTS
FOR ALL TYPES OF LIBRARIES

CATEGORY	SYSTEM CONFIGURATION		
	PRESENT SYSTEM	REGIONAL NETWORK	STATE-WIDE NETWORK
Maintenance Costs	\$ 462,271	\$ 298,814	\$ 112,843
Purchase Costs	239,655	152,793	52,822
TOTALS	\$ 701,926	\$ 451,607	\$ 165,665

REFERENCES

1. Becker, J. and R. M. Hayes. A Proposed Library Network for Washington State. Olympia, Washington State Library, 1967
2. Locke, W. N. Computer Costs for Large Libraries. Datamation, Vol. 16, 2:72, February 1970

CHAPTER 5

ATTITUDE OF LIBRARY ADMINISTRATORS TOWARDS NETWORK

There have been many studies of innovation acceptance after the fact, but virtually none have studied the phenomenon of acceptance or rejection while the innovation was in progress. The network idea is not a particularly new one in librarianship. It is only during the last decade, however, that plans for the realization of such ideas, frequently on a large scale and utilizing advanced technology have been made in any detail. The general discussion of the scope of the proposed library network for Washington State implies a considerable effort in funds as well as technical and procedural features unlike any currently in operation in the state.

The State of Washington has a good record of cooperative library activities and there are already a number of regional public library systems. The 1967 report by Becker and Hayes outlining possible network features has been widely distributed. This has been followed up in a number of network meetings in different regions of the state, addressed to the library profession. In addition, representatives of a variety of types of library were brought together for the Lake Wilderness Conference in 1968. Therefore, there is every reason to expect widespread acceptance of the network concept among library administrators in the state.

5.1 Questionnaire Survey of Library Administrators

Information was gathered through the use of a questionnaire specially developed for this study. The questionnaire together with an explanation of some technical details of its analysis is given in Appendix E.

The design of the questionnaire and its interpretation are based largely on Nash's thesis.¹ Osgood² and Moreno³ are the original sources for the methods of the semantic differential and sociometry respectively. Nash cites these two workers and discusses more recent writing on their methods at some length as well as the derivation of the communications categories used in Section 5.4.

5.1.1 Content

Working with the assumption that favorable opinion and acceptance were correlates, it was decided to measure the opinion of library administrators toward the network and some of its possible component parts. The opinion gathering technique was the semantic differential. Opinions were gathered on the following aspects of the network:

- a. Network concept as a whole.
- b. Concept of regional centers.
- c. Concept of one central facility or switching center.
- d. Concept of type of library centers.

- e. Interlibrary loan concept.
- f. Centralized processing concept.
- g. Collection management concept.
- h. Facsimile transmission concept.
- i. Universal reference service concept.
- j. Union list production concept.

It can be seen that (a) is concerned with the overall impression of the network, (b)-(d) with various organizational forms that it might take, and (e)-(j) with various services it might offer or functions it might perform.

Each concept was measured by the use of ten sets of polar terms to discover feeling or opinion toward the concept. The polar term sets were:

- a. Useful - useless
- b. Rational - intuitive
- c. Progressive - regressive
- d. Important - unimportant
- e. Expensive - inexpensive
- f. Timely - untimely
- g. Permissive - prohibitive
- h. Possible - impossible
- i. Necessary - unnecessary
- j. Central - peripheral

On the questionnaire the positive and negative poles were shifted randomly (in fact b, d, e, f, g, and j were reversed). Each set of polar terms used had a seven place scale representing total acceptance (7) through neutrality (4) to total rejection (1).

Basic information about the libraries and librarians responding was obtained. This information may be divided into four categories:

- a. Basic data on libraries - type of library, support, geographic area, population served, size of collection, annual expenditure, collection emphasis, clientele needs, circulation, interlibrary loans and informal interlibrary loans.
- b. Basic data on librarians - communications characteristics of librarians (isolate, localite, library localite, cosmopolite, library cosmopolite, see Section 5.4) and professional status of librarians.
- c. Example of expectations - current time to fill an inter-library loan request, estimated desirable, realistic times for 1970, 1973, 1975.
- d. Network related data on librarians - participation (would

the respondent like his library to participate in the network), recommendation (would his library concur with his recommendation), discussion of network, source of best information on the network and familiarity with network concept.

To attempt to discover patterns of interpersonal influence, several sociometric questions were asked of each library administrator:

- a. With whom do you discuss significant library administrative matters?
- b. From whom did your most reliable information come?
- c. Who has been your primary discussion partner during the past year in matters relating to the network?
- d. To whom would you go for additional reliable information concerning evaluation of the network concept?

Of the 140 questionnaires sent out, 129 were returned and 119 proved to be usable for computer analysis. As shown in Appendix Table E.1, the usable returns constituted a high and even proportion of the sampled universe, broken down by type of library. Interpretations made of these usable returns may therefore be considered representative of the sampled population.

5.1.2 Interpretation

As explained in Appendix E, over 2,500 two-way tables were obtained from the data, each table including table, row and column percentages, as well as values of chi-square and degrees of freedom. The row and column percentages enable the distribution of the data across the entire sample to be seen for one or another of the variables of the table. The values of chi-square and degrees of freedom enable the probability that the two variables of the table are statistically independent to be determined (from published tables of the chi-square distribution). Low values of such probability are indicators of a significant lack of statistical independence.

The discussion in Sections 5.2 and 5.3 is based upon 60 tables at the .001 level of significance (see Appendix E). Table 5.1 shows that these correlations lie mainly in four areas, within the data on libraries and acceptance and between acceptance data and basic and network-related data on librarians. The latter is striking and shows that personal not institutional characteristics correlate most strongly with acceptance or rejection of the network. Quantitative expectations in the example given correlate with nothing. A complete listing of all the significant correlations recorded is given in Appendix Table E.2. Unfortunately many of these, as reported later, have no clear interpretation.

TABLE 5.1
FREQUENCY OF SIGNIFICANT CORRELATIONS BY TYPE OF VARIABLE

	BASIC DATA ON LIBRARY	BASIC DATA ON LIBRARIAN	EXPECTATION	NETWORK- RELATED DATA ON LIBRARIAN	ACCEPTANCE
Basic Data on Library	46	2		3	2
Basic Data on Librarian	2				11
Expectation					
Network-Related Data on Librarian	3			2	8
Acceptance	2	11		8	20

(A total of 60 tables at the .001 level of significance.)

5.2 Characteristics of the Respondents and Their Libraries

The discussion is divided into five parts: basic data on libraries; basic data on librarians; example of expectations; network-related data on librarians; and evaluation of network meetings.

5.2.1 Basic Data on Libraries

Data were obtained on characteristics of the libraries of the respondents to serve as general background to interpretation of respondent's attitudes to the network. These data are summarized in Appendix E in Tables E.3a-E.3k and cover type of library, support, geographic area, population served, size of collection, annual expenditure, collection emphasis, clientele needs, circulation, interlibrary loans, and informal interlibrary loans. There are no surprises in the data and the frequent correlations between variables are to be expected on the basis of experience.

Public, special and community college libraries far outnumber college and university libraries. All public, community college, and some college and university libraries are publicly supported. Almost all special and the remainder of the college and university libraries are privately supported. Public libraries tend to serve the largest populations, have collections supporting recreation and general information and have high circulations. Academic libraries

are varied in size, with community college libraries having the smallest collections and circulations. Academic libraries have collections which are mainly curriculum supportive, have a relatively high rate of interlibrary loan, and are relatively more likely to have discussed the network outside of scheduled meetings. Special libraries present a picture of small research and special subject collections, low circulations, and are relatively unlikely to have discussed the network outside of scheduled meetings.

The geographical distribution of the respondents' libraries is not at all even. Considering the suggested twelve network regions, King County has 25% of the state total, another four regions have 43% of the total, seven small regions make up the remaining 32%.

Most of the respondents' libraries serve medium-small or small populations. Large populations account for the largest collections, annual expenditures, and circulations. The respondents from small libraries are the only ones who would not like their library to join the proposed network.

The respondents' libraries have a variety of collection sizes. Large and medium-large collections are general information in emphasis and small collections in the sample are research oriented. The larger the collection, the greater is circulation, interlibrary loan, and the degree of familiarity with the network.

Over half the respondents' libraries have annual expenditures of over \$100,000. Nonprofessionals administer almost all libraries in the sample with small expenditures.

Collection emphasis of the respondents' libraries is fairly evenly distributed between research, recreation, curriculum support, general information and special subject. This distribution is closely correlated with stated clientele needs. With one exception, research and special subject emphasis account for the lowest circulation. Recreation and general information account for the highest circulation.

5.2.2 Basic Data on Librarians

Data on two characteristics of the respondents as individuals, whether or not they are professional librarians, and their communications category were obtained (see Section 5.4 for explanation of terms). There is considerable correlation between these two characteristics and the degree of acceptance measured by the semantic differential (see Table E.2).

Table 5.2a shows the distribution of the respondents' communications categories. There is only one in the cosmopolite category, and he is ignored in Section 5.4. Otherwise the categories are fairly evenly distributed. In terms of attitude toward the network, isolates and library cosmopolites are strongly positive, but localites and library localites are more neutral. The library cosmopolite is

also strongly positive to the concept of collection management.

Table 5.2b shows the distribution of the respondents by professional status. About one in seven is not a professional librarian. Professionals are much more positive than nonprofessionals about some network functions.

5.2.3 Example of Expectations

Table 5.3a shows the distribution of current interlibrary loan times reported by the respondents. Table 5.3b shows three sets of "functionally realistic" estimates made by the respondents for 1970, 1973, and 1975. It is interesting to see the systematic improvement in expectations. The percentage of loans taking less than 8 days moves from 64 percent in 1970 through 86 percent in 1973 to 91 percent in 1975. The percentage taking 3 days or less follows the sequence 13, 36, to 68 percent.

5.2.4 Network-Related Data on Librarians

Respondents reply nine to one in favor of their library participating in the network (Table 5.4a). It is only the respondents from libraries serving small populations that would not like their library to join the network. On both the general network concept and that of union lists participants are consistently more positive than non participants.

About one in six of the respondents believes that his library would not concur in his statement on participation (Table 5.4b). This minority is relatively negative to the concept of collection management.

Only 40 percent of the respondents have discussed the network outside of scheduled meetings (Table 5.4c). Discussants are relatively more likely to be from academic libraries and to be more familiar with the network concept. Nondiscussants are more likely to be from special libraries.

Table 5.4d shows the distribution of the respondents' best source of information on the network. Personal-written communication is not significant; otherwise written-published and oral-group are comparable and ahead of oral-personal.

Table 5.4e shows the distribution of the respondents' expressed familiarity with the network. In general, the familiarity claimed is not great. Those more familiar with the network are more likely to discuss the network outside of scheduled meetings and/or to come from libraries with large collections.

5.2.5 Evaluation of Network Meetings

Shortly after the Becker and Hayes report was published in 1967, a number of network meetings were held around the state in an

TABLE 5.2a
BASIC DATA ON LIBRARIANS --
COMMUNICATIONS CHARACTERISTICS

COMMUNICATIONS TYPE*	NUMBER OF LIBRARIANS	PERCENT
Isolate	26	22
Localite	36	31
Library Localite	17	14
Cosmopolite	1	1
Library Cosmopolite	<u>38</u>	<u>32</u>
TOTAL	118	100

*For derivation of type see Section 5.4

TABLE 5.2b
BASIC DATA ON LIBRARIANS --
PROFESSIONAL STATUS

PROFESSIONAL STATUS	NUMBER OF LIBRARIANS	PERCENT
Professional	101	86
Nonprofessional	<u>16</u>	<u>14</u>
TOTAL	117	100

TABLE 5.3a
EXAMPLE OF EXPECTATIONS--
CURRENT INTERLIBRARY LOAN TIME

CURRENT INTERLIBRARY LOAN TIME	NUMBER OF RESPONDENTS	PERCENT
0-3 days	5	5
4-7 days	26	26
8-14 days	38	38
15-30 days	25	25
Over 30 days	<u>6</u>	<u>6</u>
TOTAL	100	100

TABLE 5.3b
EXAMPLE OF EXPECTATIONS--
FUTURE INTERLIBRARY LOAN TIMES

FUTURE INTERLIBRARY LOAN TIMES	1970		1973		1975	
	# RESPOND	%	# RESPOND	%	# RESPOND	%
1 day	3	4	8	10	24	31
2-3 days	6	9	21	26	28	37
4-7 days	34	51	41	50	18	23
Over 8 days	24	36	12	14	7	9
TOTAL	67	100	82	100	77	100

TABLE 5.4a
NETWORK-RELATED DATA ON LIBRARIANS --
PARTICIPATION

WOULD LIKE LIBRARY TO PARTICIPATE	NUMBER OF RESPONDENTS	PERCENT
Yes	101	89
No	<u>12</u>	<u>11</u>
TOTAL	113	100

TABLE 5.4b
NETWORK-RELATED DATA ON LIBRARIANS --
RECOMMENDATIONS

BELIEVE LIBRARY WOULD CONCUR IN RECOM. ON PARTICIPATION	NUMBER OF RESPONDENTS	PERCENT
Yes	93	84
No	<u>18</u>	<u>16</u>
TOTAL	111	100

TABLE 5.4c
NETWORK-RELATED DATA ON LIBRARIANS --
DISCUSSION

HAVE TAKEN PART IN DISCUS- SION OF NETWORK OUTSIDE OF SCHEDULED MEETINGS	NUMBER OF RESPONDENTS	PERCENT
Yes	47	40
No	<u>70</u>	<u>60</u>
TOTAL	117	100

TABLE 5.4d
NETWORK-RELATED DATA ON LIBRARIANS--
BEST INFORMATION

SOURCE OF BEST INFORMATION	NUMBER OF RESPONDENTS	PERCENT
Written Personal	3	3
Written Published	40	41
Oral Personal	17	17
Oral Group	<u>39</u>	<u>39</u>
TOTAL	99	100

TABLE 5.4e
NETWORK-RELATED DATA ON LIBRARIANS--
FAMILIARITY WITH NETWORK

FAMILIARITY WITH NETWORK*	NUMBER OF LIBRARIES	PERCENT
7	5	7
6	10	14
5	12	16
4	15	20
3	11	15
2	13	18
1	<u>7</u>	<u>10</u>
TOTAL	73	100

*The scale ranges from extremely familiar (7) to completely unfamiliar (1).

effort to familiarize the profession with the proposed network. As an ad hoc addition to the present study, a list of names of attendees was obtained and used to classify respondents as attendees or non-attendees while maintaining confidentiality. Correlation tables were constructed between attendance and discussion, familiarity and network (mean scale) variables with the following results. Attendees were more likely than nonattendees to have discussed the network outside of scheduled meetings with a chi-square significance level of .1. They were more familiar with the network at a significance level of .05. (Neither of these levels are strongly significant.) They were more positively in favor of the network at a significance level of .90, i.e., completely nonsignificant. Therefore, attending the network meetings increased the likelihood of discussion and familiarity with the network, but did not persuade in favor of the network. The meetings had a stimulating, informative character, rather than persuasive.

5.3 Acceptance of Network Concept

For each question concerning a network function ten scales were marked, each with a value from 7 (strong acceptance) through 4 (neutrality) to 1 (strong rejection). For each question these were averaged for a "mean response" scale. The distribution of these mean responses is shown in Table 5.5 together with the mean of the mean for each function, and the overall mean for all scales. The distribution of original scale values for each function is shown in Table 5.6 together with the same means. The distribution of original scale values for each scale of the semantic differential is shown in Table 5.7, together with the same means.

Comparing Tables 5.5 and 5.6 there is a clear difference in the distributions. Distributions of the mean responses in Table 5.5, individually and in the mean, have extremely low values for acceptance values 1, 2, 3 and typically peak at acceptance values of 5 or 6. However, distributions of original scale values, and also their mean, in Table 5.6 have higher values for acceptance values 1, 2, 3 and frequently peak at acceptance values of both 4 and 7. The distribution in Table 5.6 arises from two factors in the responses--one of increasing frequency of positive feeling and the other of neutrality or uncertainty. When these are superimposed there are peaks at 4 and 7. In the case of Table 5.5, however, at the time of averaging to obtain the mean response to a function, the tails of the distribution are drawn towards the center, since ten checks of scale value 1 or 7 are not likely, and so extreme values of individual scales are eliminated in the mean. The difference in row means arises from rounding and is not significant. To summarize, the population is generally in favor of the network, but there is a significant component that is either neutral or uncertain about it.

Using the figures of Table 5.6, acceptance of different network

TABLE 5.5
ACCEPTANCE OF NETWORK FUNCTIONS (MEANS)

The figures are percentages of total responses which vary from 105 to 109 for the various functions.

NETWORK FEATURE	ACCEPTANCE*							MEAN
	1	2	3	4	5	6	7	
Network	0	0	0	7	24	55	14	5.76
Regional Centers	0	1	1	9	35	46	8	5.48
Central Facility	0	1	8	18	30	34	9	5.15
Type of Library Cent.	0	5	13	15	30	27	10	4.91
Interlibrary Loan	0	0	2	6	18	53	21	5.85
Central Processing	0	5	10	18	30	29	8	4.92
Collection Mgt.	2	2	7	23	33	29	4	4.86
Facsimile Transmission	0	0	1	12	17	48	22	5.78
Reference Service	1	0	0	11	30	38	20	5.63
Union Lists	0	0	1	8	13	51	27	5.95
MEAN	0	1	4	13	26	41	15	5.47

* The acceptance scale is the mean of the ten individual scales of the semantic differential, averaged for each question, and ranges from strong acceptance (7) through neutrality (4) to strong rejection (1).

TABLE 5.6
ACCEPTANCE OF NETWORK FUNCTIONS (FREQUENCIES)

The figures are percentages of total responses which vary from 105 to 109 for the various functions.

NETWORK FEATURE	ACCEPTANCE*							MEAN
	1	2	3	4	5	6	7	
Network	1	2	3	14	12	28	40	5.78
Regional Centers	1	2	3	17	19	26	32	5.57
Central Facility	3	4	7	20	19	22	28	5.20
Type of Library Center	8	7	5	21	14	18	27	4.68
Interlibrary Loan	2	3	3	13	10	16	53	5.86
Central Processing	6	6	5	21	16	18	28	5.01
Collection Mgt.	4	5	6	27	19	19	20	4.89
Facsimile Transmission	2	1	3	17	8	18	51	5.86
Reference Service	1	2	3	18	14	21	41	5.69
Union Lists	0	1	2	14	11	21	51	6.02
MEAN	3	3	4	18	14	21	37	5.48

* The acceptance scale shows the percentage frequency of obtaining scale values shown for each network function.

functions can be compared. The network concept as a whole has a mean of 5.78. In the questionnaire the next three questions are related to possible forms or configurations the network might take. These rank in descending order of acceptance by mean:

- 5.57 Regional Centers
- 5.20 Central Facility
- 4.68 Type of Library Center

The remaining questions are presented in the questionnaire as dealing with possible functions or services of a network. They rank in descending order of acceptance by mean:

- 6.02 Union Lists
- 5.86 Facsimile Transmission
- 5.86 Interlibrary Loan
- 5.69 Reference Service
- 5.01 Central Processing
- 4.89 Collection Management

It is interesting to see the strength of functions associated with interlibrary loan and the positions of central processing and collection management.

Strongest relative support for the overall network concept comes from those who would like their library to participate and/or who are library cosmopolites or isolates. Library localites and localites tend to be more frequently neutral on the concept. The only clear correlation with the concept of regional centers is that professionals are more positive than nonprofessionals. The concept of collection management is most strongly supported by library cosmopolites and isolates. Professionals are more strongly in favor of facsimile transmission than nonprofessionals and the same is true for reference services via the network. Both professionals and those who would like their library to join the network are much more positive about the concept of union lists.

5.4 Interpersonal Influence

Four sociometric questions were asked in the questionnaire.

- a. With whom do you discuss significant library administrative matters?
- b. From whom did your most reliable information come?
- c. Who has been your primary discussion partner during the past year in matters relating to the network?
- d. To whom would you go for additional reliable information concerning evaluation of the network concept?

On the basis of answers to these four questions, respondents were assigned a communications characteristic or type, defined as follows:

Isolate. A librarian who has no interaction with others on matters pertaining to the administration of his library.

Localite. A librarian who has the major part of his contacts pertaining to the administration of his library with local nonlibrarian individuals.

Library Localite. A librarian who has the major part of his contacts pertaining to the administration of his library with local librarians.

Cosmopolite. A librarian who has the major part of his contacts pertaining to the administration of his library with nonlocal, nonlibrarian individuals.

Library Cosmopolite. A librarian who has the major part of his contacts pertaining to the administration of his library with nonlocal librarians.

The derivation of these terms is described in detail in Nash's thesis.¹ There was only one respondent in the cosmopolite category and this category is therefore ignored in what follows.

The distribution of the respondents by mean communications characteristic is given in Table 5.2a. An analysis of the responses for each question separately leads to Table 5.7. Here respondents are separately characterized for each question, depending on their answer. As can be seen from the answers to the last three questions, there has not been much discussion of the network.

Comparing breakdowns by type of library (which are not shown), patterns of communication are very similar across all types of library. Librarians tend to stick to their own kind. Community college librarians go to community college librarians and public librarians to public librarians. The only interlibrary agency showing any significant influence across type of library lines is the State Library (55 times). Geographic proximity seems to play a very limited role. Discussion partners are fairly random. It had been hoped to identify a small number of influential partners but this does not seem to be the case. The influence of any one individual is minimal.

In the area of general administrative discussions, Table 5.7 shows a large proportion of localites. They go to local individuals for assistance and consultation. These individuals are not librarians but local board members, city officials, faculty committee members or others who are directly responsible for the policy and financial backing of the library. This points up the factor of lay participation in the decision-making process.

TABLE 5.7
COMMUNICATIONS CHARACTERISTICS AND ADMINISTRATORS' ACTIVITIES

ACTIVITY	ISOLATE	LOCALITE	LIBRARY	LIBRARY	TOTAL
			LOCALITE	COSMOPOLITE	
General					
Discussion	19	59	15	24	117
Network					
Information	20	1	3	34	58
Network					
Discussion	25	3	10	20	68
Network					
Evaluation	12	1	0	41	54

In the area of network information, Table 5.7 shows that respondents are almost evenly split between library cosmopolites, seeking their information from agencies such as the State Library, and isolates finding answers for themselves. In this area there is very little reliance on other local librarians or their own governing bodies. This same pattern is followed in the question of finding additional evaluative information about the network. In the area of network discussion, there is still a large proportion of isolates and library cosmopolites.

Another interpretation of Table 5.7 is that the answers to each question are essentially the same but that localites are almost entirely unfamiliar with the network and so drop out from the last three questions.

In summary then, if the returns are representative, it is clear that the network is not like ordinary, routine administrative business. Dependencies and communication characteristics of librarians change considerably between routine tasks and network matters.

5.5 Significant Points

Personal and not institutional characteristics correlate most strongly with acceptance or rejection of the network. In particular, professional status as opposed to nonprofessional and an affirmative answer to the question, "Would you like your library to participate in the network?" were strongly indicative of positive acceptance.

The survey showed the expected institutional correlates quite clearly, involving such variables as size of collection, population served, type of library, collection emphasis, clientele needs, and circulation.

Together with some ad hoc data on attendance at the network meetings of 1967-68 designed to inform the profession about the network, the survey showed that they served an informative purpose.

Acceptance of the network is widespread as measured by the semantic differential. Possible configuration alternatives offered in the questionnaire rank in descending order of acceptance (and considerably spread out): regional centers, central facility, and lastly type of library center. Possible functions or services that a network might perform rank in descending order of acceptance: union lists, facsimile transmission, interlibrary loan, reference service, central processing, and collection management. The first four are fairly close but the last two are very far down.

Interpersonal communications categories can be set up for each respondent. Localites, perhaps as expected, seem completely unfamiliar with the network. Another slightly different interpretation

is that nobody is localite when it comes to the network and very few even are library localites. They become isolates and go it alone or library cosmopolites and link up with others outside their community.

REFERENCES

1. Nash, W. V. Characteristics of Administrative Needs of Public Libraries in Various Communication Categories. Urbana, University of Illinois, 1964 (Ph.D. Thesis)
2. Osgood, C. F., G. J. Suci and P. H. Tannenbaum. The measurement of Meaning. Urbana, University of Illinois Press, 1957
3. Moreno, J. L. Who Shall Survive? Washington, Nervous and Mental Disease Publishing Company, 1934

CHAPTER 6 SUMMARY

In previous chapters separate analyses have been presented of likely effects of implementing either a regional network or a state-wide network. Both the regional and state-wide network concepts imply that there would be some centralization of activities. For a regional network one library in each region would serve as a focal point for performance of network functions; for the state-wide network one library in the state would serve as the focal point. If either configuration is adopted over the present system, the functions of interlibrary loan, technical services, and collection management would be facilitated through new organizational arrangements. It is essential to consider the consequences in terms of both costs and benefits and their distribution among participating libraries.

6.1 Costs of Alternate Systems

Total annual costs associated with interlibrary loan, technical services, and collection management for the three system configurations are shown in Table 6.1. In terms of the three functions that have been analyzed, both the regional and state-wide networks indicate cost differentials with respect to the present system. The regional network offers a differential of \$575,000 with respect to the present system consisting of \$325,000 in technical services and \$250,000 through collection management -- a total change of 20% from costs of the present system. The state-wide network offers a differential of \$1,215,000 with respect to the present system consisting of \$680,000 in technical services and \$535,000 through collection management -- a total change of 43% from costs of the present system.

TABLE 6.1
TOTAL ANNUAL COSTS FOR ALTERNATE SYSTEM CONFIGURATIONS

FUNCTION	SYSTEM CONFIGURATION		
	PRESENT SYSTEM	REGIONAL NETWORK	STATE-WIDE NETWORK
Interlibrary Loan	\$ 195,000	\$ 195,000	\$ 195,000
Technical Services	1,945,000	1,620,000	1,265,000
Collection Management	700,000	450,000	165,000
TOTALS	\$2,840,000	\$2,265,000	\$1,625,000

These cost differentials are based only on current levels of activity. Development of either a regional network or state-wide network would have at least two significant effects on levels of activity in the system and the costs shown in Table 6.1. Interlibrary loan costs can be expected to rise due to an increase in level of activity

resulting from improved service. The second significant effect stems from elimination of low circulation volumes from local libraries if either network configuration is implemented. If equal service is maintained, some of these volumes would be obtained through interlibrary loan from the regional or state-wide library which maintains the collection of low circulation volumes. Available data are not adequate to determine additional interlibrary loan activity generated from these two sources, but it is reasonable to assume that a doubling or tripling of current activity levels might occur. For purposes of discussion, it is assumed that interlibrary loans double to approximately 70,000 for the regional network and triple to 105,000 per year for the state-wide network.

In both the regional and state-wide network configurations additional communication costs are incurred because of centralization of activities. While details of the communications systems that might be used have not been investigated, an implicit assumption in all discussions of the network concept has been that more sophisticated systems than present mail and occasional telephone communication would be used. Primary traffic on a communications system would be due to interlibrary loan activity and technical services. As suggested in the preceding paragraph, interlibrary loan might generate 70,000 transactions per year for the regional network and 105,000 transactions for the state-wide network. In the technical services area, a total of 745,000 volumes and 300,000 titles are processed per year. These numbers have to be handled regardless of whether a network is regional or state-wide. Since multiple volume orders may be handled in a single transaction, it is assumed that the number of transactions handled by the communications system is equal to the number of titles processed, that is, 300,000 per year for either the regional or state-wide network. Without specifying details of procedures or the nature of communications equipment to be used, estimates of cost per transaction can only be guesses as to the general magnitude of actual costs that may be incurred. To incorporate this cost in the total estimate, a figure of \$1.00 per transaction is used. This estimate is comparable to experience elsewhere.

In Table 6.2 total annual costs from Table 6.1 have been adjusted to take into consideration increased interlibrary loan activity for the regional and state-wide networks and communications costs. With these additional costs considered, the differential between the present system and the regional network is slight, and for the state-wide network it is reduced to \$420,000.

Cost data in Tables 6.1 and 6.2 should be regarded as gross estimates of costs of actual operations. Accurate cost estimates are impossible to make since basic data on current library operations are fragmentary, and it has been impossible within the bounds of this research project to specify in detail the operating systems that might

TABLE 6.2
ADJUSTED TOTAL ANNUAL COSTS FOR ALTERNATE SYSTEM CONFIGURATIONS

FUNCTION	SYSTEM CONFIGURATION		
	PRESENT SYSTEM	REGIONAL NETWORK	STATE-WIDE NETWORK
Interlibrary Loan	\$ 195,000	\$ 390,000	\$ 585,000
Technical Services	1,945,000	1,620,000	1,265,000
Collection Management	700,000	450,000	165,000
Network Communications	--	370,000	405,000
TOTALS	\$2,840,000	\$2,830,000	\$2,420,000

be used in the regional and state-wide networks. Also, collection management costs include only low circulation volume acquisition and maintenance costs and do not include all acquisition and maintenance costs for collections in the state. These may well be on the order of \$5,000,000 per year.³ Accordingly, when uncertainty in the cost estimates and the magnitude of all costs are taken into consideration, cost differences between systems revealed by this study do not appear to be sufficient to permit a choice to be made between the present system, a regional network, or a state-wide network on the basis of cost alone. Essentially, the results indicate that total operating costs of the three systems are similar, although the distribution of costs among libraries would be different for the three configurations.

6.2 Benefits from Alternate Systems

Benefits have not been assessed quantitatively since the major effort in the research study has been to determine costs of operation of alternate systems which provide at least the current level of service. However, some numeric information is available to indicate that improvements in service would take place with either network configuration. Currently, most resources in the state are presumably available to any library in the state through interlibrary loan. However, the process of locating and obtaining materials does not encourage widespread use of all resources in the state. For most patrons readily available materials are those in the local library and, while other materials may be available through interlibrary loan, this is not an important source of materials.⁴ With either network configuration, resources in other libraries would be readily available with libraries sharing regionally in the regional network and state-wide in the state-wide network. The regional configuration would make available from 99,000 to 959,000 titles depending on the region. For the state-wide network, all titles in the state -- a total of 1,129,000 titles -- would be readily available to all libraries. Both network configurations offer the likelihood of increases in available titles with the state-wide network offering the greatest increase.

In the preceding section, cost differentials for the performance of certain functions between alternate systems were discussed. These differentials will not be realized as cost savings directly. Instead, the result will be released resources to be applied to library services at the local level.

The two network configurations not only provide for wider availability of resources than at present, but they also offer greater growth potential for future development of library services. Higher volumes of activity and larger organizational units resulting from implementation of a network would allow adoption of modern technology, automation of certain activities, and use of more highly trained and specialized personnel. Improved planning of acquisition of materials through the network would also result in better use of the funds now available. While either the regional or state-wide network configuration offers potential for improvements, the state-wide network affords the greatest opportunity for long-run increases in effectiveness. Because of the uneven distribution of resources and population in the state, a regionally oriented network does not result in operations of sufficient size in many regions to produce benefits that would be obtained by a state-wide network.

Since cost estimates for alternate system configurations do not result in significant differences between the present system and the two network configurations, selection of a preferred alternative rests on an assessment of relative benefits of the different systems. Evaluation of benefits is, of course, much more subjective than calculation of costs. However, this evaluation is crucial to the establishment of a rational base for future development of library services in the state.

6.3 Future Research and Development

The present study has illustrated the application of quantitative modeling to library operations in the state and has resulted in some simple models and operational concepts. Library functions of inter-library loan, technical services, and collection management have been identified and described. Alternate system configurations -- the present system, a regional network, and a state-wide network -- have been analyzed, and costs and benefits associated with each of these system alternatives have been compared. The concepts used are elementary and unsophisticated, and future studies in this state or elsewhere must seek to refine them.

This research has also demonstrated the need for a more extensive and reliable data base regarding library operations in the state. While expenditures in excess of \$25,000,000 are made annually on library services in the state of Washington, data that are available on resulting operations and their effectiveness are incomplete and difficult to coordinate. Much of the data used in this study were not available from existing reports and had to be obtained from field

studies and estimates made during the course of the project. The analyses that have been performed suggest the type of managerially and analytically oriented data which are required to evaluate library operations. Efforts should be made in the future to collect and evaluate this type of data on a regular basis.

In addition to these general tasks of refining the models and systematizing data collection, additional analyses should be undertaken to fill out and complete this study.

All discussion of regions in this report and all regional analyses follow geographical outlines used in the Becker and Hayes report.⁵ These boundaries, in turn, follow the geographical boundaries originally suggested by Bowerman⁶ and are not necessarily optimal. Some regions are small relative to others and, in view of modern highway and communications systems, can be combined with others to make units of more reasonable size. Although one alternative consisting of five regions was developed during the course of this project, there was insufficient time to perform any analysis of this regional structure. Further analyses should be performed to determine rational boundaries for regions other than the ones that have been utilized throughout this study.

If a network is implemented, all costs and benefits will not be realized immediately. Instead, there will be a gradual change as the system develops. Also, costs and benefits will not be equally distributed to all units in the system. A clearer idea of the rate at which costs and benefits develop and the way in which costs are redistributed is required to develop funding policies and realistic expectations of network benefits.

Another question about which nothing has been said is the cost associated with converting to a particular network configuration. The study has been primarily concerned with operating costs. Estimates must be made of initial costs of setting up a network, such as investment in computer hardware and other equipment, development of procedures and software, employee training, and so forth.

Finally, the estimates of communications costs and flows in section 6.1 are only a first approximation. A major residual task is to refine these figures.

REFERENCES

1. See Tables 2.7, 3.4, 4.10, 4.11, and 4.12 for further cost breakdowns.
2. This cost per transaction is of the same magnitude as those that have been actually realized in the Texas network. See Preliminary Evaluation, Texas State Library Communication Network, 1968. Austin, Texas State Library, Field Services Division, 1969 pp. 13-14
3. Total collection management costs were not studied in detail. The \$5,000,000 estimate is derived from the costs of maintaining approximately 10,000,000 volumes in the state at a cost of \$.20 per volume per year and acquiring 750,000 volumes per year at \$4.00 per volume.
4. Interlibrary loans represent a fraction of one percent of total library circulation.
5. Becker, J. and R. M. Hayes. A Proposed Library Network for Washington State. Olympia, Washington State Library, 1967
6. Bowerman, C. E. A Proposed Regional Library Plan for the State of Washington. Olympia, Washington State Library, 1950
7. Appendix D, for example, suggests that operating costs can be reduced through investment in the automation of certain technical services.

PART II: APPENDICES

APPENDIX A

BOOK COLLECTION CHARACTERISTICS

Data presented in this appendix are concerned with the description and enumeration of library book holdings. Analyses are provided by subject, age, and overlap between collections.

A.1 Basic Methodology

The number of titles held by subjects (Tables A.4-A.7) were derived from measurements of shelf lists in the various libraries studied. Ruler measurements were made to the nearest .1 inch and results were recorded. Not less than five card groups were pulled from each of the shelf list, the cards counted, the cards per inch calculated for each group, and the average number of cards per inch for the shelf list was determined. This number multiplied by the inches of cards per subject provided the number of estimated titles for each subject.

A.2 Correlation Tables - L.C. and Dewey Classifications

A comparison of book holdings is difficult if not impossible when some collections are cataloged in the Library of Congress classification system and others are cataloged in the Dewey Decimal classification. In order to make such comparison possible, a series of matrices were developed by which data arrayed by classification scheme in either the Dewey or L.C. system is convertible to the other. This was achieved by computer analysis of MARC records for titles classified in both systems by the Library of Congress.

The titles appearing on MARC tapes issued from July 2, 1969 to July 3, 1970 (Volume 1, No. 15 through Volume 2, No. 16) were selected as a data base. A program was designed to translate the MARC data which is in ASCII format into EBCDIC format for use in the Washington State Data Processing Center with COBOL programming. A second program exploded the records, extracted the call numbers, did the appropriate countings and calculations and formatted the output into matrices. In this process it was found that of the 62,886 catalog records, 270 contained no LC number and 3,502 contained no Dewey number. Eliminating these records produced a data set of 59,115 records meeting correlation requirements. Listings for both programs are given in Figures A.1 and A.2.

The Major Matrix, Table A.1, shows the correlation of single letter LC classes with hundred groups in Dewey, e.g., 100's, 200's, etc. Of the 210 possible correlations, it can be seen that there were no correlations (no matches) for only 21. The table is read as follows. Catalog records for 6,943 titles were found which were classed by the Library of Congress in both H (LC) and in the 300's (Dewey). These

6,943 records were 11.7% of the 59,115 records analyzed (lower right corner). There were 8,532 "H" classed records in total (sum of the horizontal row). There were 17,530 "300's" classed records in total (sum of the vertical column).

For each of the correlations shown in the Major Matrix, Table A.1, a minor matrix was developed showing correlations between two-letter L.C. classes, e.g., HA, HB, etc., and Dewey "ten's" classes, e.g., 310's, 320's, etc. One of these 189 minor matrices is duplicated in Table A.2, Minor Matrix H3. The table is read as follows. Catalog records for 7 titles were found which were classed in both HA(LC) and in Dewey classes, the first two digits of which were 3 and 0 (300-309+). These 7 records were 6.4% of the 110 HA records (under "Total" in far right column) and .3% of the 2,203 titles classed 300-309+ (sum of the vertical column).

For the purposes of this study a translation-correlation table was necessary only at the level of single letter LC groups and Dewey hundred groups. Table A.3 was developed from Major Matrix, Table A.1, and is read as follows. Catalog records for 6,943 titles classed in both H(LC) and in the 300's (Dewey) represented 81.38% of all H classed titles of which there were 8,532 titles. This table translates from LC to Dewey but is not reversible. It was used in constructing Table 4.1 in Part I, Text of this report.

The use of correlation tables as aids in reclassification is a possibility that might merit study and testing. A number of correlations between tens level Dewey numbers and two-letter LC numbers were high. For example, 82% of the items classed in 440-449+ were classed in "PC" and 91% of the items classed in 880-889+ were classed in "PA." A table listing these high correlates might be helpful at this or at higher levels, at least to inexperienced catalogers.

MAJOR MATRIX
8-6-70TABLE A.1
WASHINGTON STATE LIBRARY
CORRELATION MATRIX COMPARING DEWEY DECIMAL AND LC NUMBERING SYSTEMSR200638
PAGE 1

LC	DEWEY 0	DEWEY 1	DEWEY 2	DEWEY 3	DEWEY 4	DEWEY 5	DEWEY 6	DEWEY 7	DEWEY 8	DEWEY 9	TOTAL
.		1		1			1				1
/											2
A	117 .2%	8 .0%	3 .0%	55 .1%	4 .0%	50 .1%	15 .0%	5 .0%	8 .0%	10 .0%	275
B	12 .0%	1209 2.0%	2484 4.2%	113 .2%	5 .0%	3 .0%	19 .0%	14 .0%	14 .0%	29 .0%	3902
C	24 .0%	4 .0%	4.2%	30 .1%	5 .0%	2 .0%	9 .0%	63 .1%	5 .0%	685 1.2%	837
D	14 .0%	1 .0%	16 .0%	892 1.5%	14 .0%	8 .0%	13 .0%	53 .1%	12 .0%	3549 6.0%	4572
E	14 .0%	3 .0%	33 .1%	744 1.3%	5 .0%	4 .0%	7 .0%	18 .0%	10 .0%	929 1.6%	1767
F	5 .0%	1 .0%	8 .0%	225 .4%	1 .0%	3 .0%	7 .0%	15 .0%	3 .0%	1133 1.9%	1401
G		10 .0%	7 .0%	328 .6%	1 .0%	237 .4%	84 .1%	730 1.2%	7 .0%	429 .7%	1833
H	20 .0%	70 .1%	37 .1%	6943 11.7%		53 .1%	1180 2.0%	177 .3%	8 .0%	44 .1%	8532
J	10 .0%	5 .0%	1 .0%	1721 2.9%	3 .0%	2 .0%	21 .0%	4 .0%		20 .0%	1787
K	15 .0%	3 .0%		1637 2.8%	1 .0%	7 .0%	109 .2%	4 .0%	1 .0%	12 .0%	1789
L	29 .0%	36 .1%	17 .0%	3044 5.1%	40 .1%	6 .0%	50 .1%	8 .0%	21 .0%	7 .0%	3258
M	13 .0%	2 .0%	1 .0%	29 .0%			11 .0%	643 1.1%	8 .0%	1 .0%	708
N	7 .0%		3 .0%	18 .0%			9 .0%	1799 3.0%	9 .0%	18 .0%	1863
P	223 .4%	22 .0%	27 .0%	261 .4%	648 1.1%	170 .3%	70 .1%	474 .8%	8080 13.7%	73 .1%	10049
Q	63 .1%	45 .1%	2 .0%	164 .3%	5 .0%	4875 8.2%	581 1.0%	19 .0%	5 .0%	14 .0%	5773
R	8 .0%	39 .1%	5 .0%	234 .4%	1 .0%	24 .0%	1855 3.1%	9 .0%	2 .0%	5 .0%	2182
S	11 .0%		1 .0%	195 .3%		89 .2%	990 1.7%	194 .3%	5 .0%	16 .0%	1501
T	45 .1%	4 .0%		331 .6%	2 .0%	356 .6%	3790 5.9%	299 .5%	8 .0%	20 .0%	4555
U		1 .0%		389 .7%	1 .0%	6 .0%	58 .1%	13 .0%		13 .0%	481
V	1 .0%			138 .2%		13 .0%	144 .2%	3 .0%	1 .0%	13 .0%	313
W								1 .0%			1
Z	1444 2.4%	3 .0%	3 .0%	38 .1%	3 .0%	26 .0%	163 .3%	21 .0%	16 .0%	17 .0%	1734
TOTAL	2075	1467	2658	17430	739	5934	8886	4566	8222	7037	59115

MINDR MATRIX H3
8-6-70TABLE A.2
WASHINGTON STATE LIBRARY
CORRELATION MATRIX COMPARING DEWEY DECIMAL AND LC NUMBERING SYSTEMSR130638
PAGE 9

LC	DEWEY 0	DEWEY 1	DEWEY 2	DEWEY 3	DEWEY 4	DEWEY 5	DEWEY 6	DEWEY 7	DEWEY 8	DEWEY 9	TOTAL
A	7 6.4%	63 57.3%		17 15.5%							110
B	54 15.8%	30 8.1%	3 .9%	250 72.0%	1 .3%				1 .3%		347
C	118 11.5%	3 2.5%	10 1.0%	788 76.7%	2 .2%	35 3.4%	5 .5%		25 2.4%		1028
D	106 4.7%	5.4%	11 .5%	1547 67.9%	4 .2%	102 4.5%	66 2.9%	5 .2%	82 3.6%		2277
E	5 .5%	2 .3%	4 .6%	22 3.5%	.2%	41 6.6%	4 .6%	.2%	469 75.0%		625
F	3 .3%	1 .1%	4 .4%	107 11.3%	1 .1%	10 1.1%	4 .4%	16 1.7%	140 14.8%		945
G			2 .4%	378 73.1%	1 .2%	20 3.9%	41 7.9%	.8%	5 1.0%		517
J		1 .4%	1 .4%	150 59.8%	2 .8%	81 32.3%	8 3.2%	2 .8%	3 1.2%		251
M	206 88.8%	9.4%	4 1.7%	1 3.4%	.1%	4.9%	3 1.3%	2 .1%	.3%		232
N	258 84.9%	11.7%	7 2.3%	7 2.3%	.2%	3 1.0%	12 3.9%	.1%	1 .3%		304
O	249 64.0%	11.3%	4 1.0%	4 1.0%	.2%	2 .5%	23 5.9%	1 .3%	4 1.0%		389
S			3 10.3%	1 3.4%	.1%	.1%	25 86.2%	.0%	.8%		29
T	175 49.3%	7.5%	10 2.8%	24 6.8%	2 .6%	12 3.4%	1 .3%	20 5.6%	2.0%		355
V	41 4.9%	1 .1%	3 .5%	11 1.3%	6 .7%	30 3.5%	643 75.0%	25 2.9%	4 .5%		857
X	1 .6%	.8%	20 12.6%	124 78.0%	2 1.3%	2 1.3%	2 1.3%	1 .6%	1 .6%		154
1	2 12.5%	.0%	1 6.3%	8 50.0%	1 6.3%	.1%	.2%	1 6.3%	1 6.3%		16
3	10 45.5%	.1%	3 13.6%	5 22.7%	.0%	1 4.5%	.1%	1 4.5%	.1%		22
5	3 75.0%	.5%	1 25.0%	.1%	.1%	.1%	.1%	.1%	.1%		4
6	38 76.0%	.1%	1 2.0%	5 10.0%	.1%	3 6.0%	.1%	.1%	.1%		50
8	10 76.9%	.5%	3 23.1%	.2%	.2%	2100.0%	.1%	.1%	.1%		13
9											2
TOTAL	2203	131	1851	4423	2511	1656	1207	2052	1016	480	5915

TABLE A.3
TRANSLATION TABLE BETWEEN LIBRARY OF CONGRESS CLASSIFICATION AND DEWEY DECIMAL CLASSIFICATION

LC	000	100	200	300	400	500	600	700	800	900	FIC	TOTAL TITLES	PERCENT- AGE OF TOTAL
A	117 4255	8 0291	3 0109	55 2000	4 0145	50 1818	15 0545	5 0182	8 0291	10 0364	0	275	0.47%
B	12 0031	1209 3098	2484 6366	113 0290	5 0013	3 0008	19 0049	14 0036	14 0036	29 0074	0	3902	6.60%
C	24 0287	4 0048	10 0119	30 0358	5 0068	2 0024	9 0108	63 0753	5 0060	685 8184	0	837	1.42%
D	14 0031	1 0002	16 0035	892 1951	14 0031	8 0017	13 0028	53 0116	12 0026	3549 7762	0	4572	7.73%
E	14 0079	3 0017	33 0187	744 4211	5 0028	4 0023	7 0040	18 0102	10 0057	929 5257	0	1767	2.99%
F	5 0036	1 0007	8 0057	225 1606	1 0007	3 0021	7 0050	15 0107	3 0021	1133 8087	0	1401	2.37%
G	0 0055	10 0055	7 0038	328 1789	1 0005	237 1293	84 0458	730 3983	7 0038	429 0240	0	1833	3.10%
H	20 0023	70 0082	37 0043	6943 8138	0 0000	53 0062	1180 1383	177 0207	8 0009	44 0052	0	532	14.43%
J	10 0056	5 0028	1 0006	1721 9631	3 0017	2 0011	21 0118	4 0022	0 0012	20 0112	0	1787	3.02%
K	15 0084	3 0017	0 0150	1637 9150	1 0006	7 0039	109 0609	4 0022	1 0006	12 0067	0	1789	3.03%
L	29 0089	36 0110	17 0052	3044 9343	40 0123	6 0018	50 0153	8 0025	21 0064	7 0021	0	3258	5.51%
M	13 0184	2 0028	1 0014	29 0410	0 0000	0 0000	11 0155	643 9082	8 0113	1 0014	0	708	1.20%
N	7 0038	0 0016	3 0016	18 0097	0 0000	0 0000	9 0048	1799 9656	9 0048	18 0097	0	1863	3.15%
P	223 0222	22 0022	27 0027	261 0260	648 0645	170 0169	70 0070	474 0472	4314 4293	73 0073	3766	10048	17.00%
Q	63 0109	45 0078	2 0003	164 0284	5 0009	4875 8444	581 1006	19 0033	5 0000	14 0024	0	5773	9.77%
R	8 0037	39 0179	5 0023	234 1072	1 0005	24 0110	1855 3501	9 0041	2 0009	5 0023	0	2182	3.62%
S	11 0073	0 0007	1 0007	195 1299	0 0000	89 0593	990 6596	194 1292	5 0033	16 0107	0	1501	2.54%
T	45 0099	4 0009	0 0000	331 0727	2 0004	356 0782	3490 7662	299 0656	8 0018	20 0044	0	4555	7.71%
U	0 0000	1 0000	0 0000	389 0807	1 0000	6 0125	58 1206	13 0270	0 0000	13 0270	0	481	0.81%
V	1 0032	0 0000	0 0000	138 4409	0 0000	13 0415	144 4601	3 0096	1 0032	13 0415	0	313	0.53%
Z	444 8328	3 0017	3 0017	38 0219	3 0017	26 0150	163 0940	21 0121	16 0092	17 0098	0	1734	2.93%
TOTAL	2075 3.51%	1466 2.48%	2658 4.50%	17,529 29.65%	739 1.25%	5934 10.04%	8885 15.03%	4566 7.73%	4456 7.54%	7037 11.90%	3766 6.37%	59,111	100.00%

FIGURE A.1
TRANSLATION PROGRAM -- ASCII to EBCDIC

PAGE 1

LCC	OBJECT CODE	ADDR1	ADDR2	STMT	SOURCE STATEMENT	FOIER69	8/06/70
000000				1	START		
				2	SAVE {14,12}		03020SLA
				3+	OH		03022SLA
000000	90CC 000C		0000C	4+	STM 14,12,12(13) SAVE REGISTERS		
000004	0530			5	BALR 3,0		
000006				6	USING *,3		03030SLA
000006	50D0 38DE		00BE4	7	ST 13,SAVE13		03040SLA
00000A	47F0 300A		00010	8	B BEGIN3		03019SLA
				9 *	*		03050SLA
				10 *	*		03060SLA
				11 *	*	THIS PROGRAM TRANSLATES THE MARC INFO	03070SLA
				12 *	*	FROM ASCII TO EBCDIC.	03080SLA
				13 *	*	WRITTEN DEC. 1968. BY JMW. WASH. ST. LIB.	03090SLA
				14 *	*		03100SLA
				15 *	*		03110SLA
				16 *	*		03120SLA
00000E	0700			17 *	OPEN INDCB		
000010	4510 3012		00018	18 *	CNOP 0,4		
000014	80			19 *	BAL 1,*,8 LOAD REG1 W/LIST ADDR.		
000015	000AFO			20 *	DC AL1(128) OPTION BYTE		
000018	0A13			21 *	DC AL3(INDCB) DCB ADDRESS		
				22 *	SVC 19 ISSUE OPEN SVC		
00001A	0700			23 *	OPEN (OUTDCB,OUTPUT)		03122SLA
00001C	4510 301E		00024	24 *	CNOP 0,4		
000020	8F			25 *	BAL 1,*,8 LOAD REG1 W/LIST ADDR.		
000021	000B50			26 *	DC AL1(143) OPTION BYTE		
000024	0A13			27 *	DC AL3(OUTDCB) DCB ADDRESS		
				28 *	SVC 19 ISSUE OPEN SVC		
				29 *	*	FIRST IT IS NECESSARY TO FIND THE END OF RECORD	03130SLA
				30 *	GET INDCB,MRCREC		03140SLA
000026	4110 3AE4		00AFO	31 *	LA 1,INDCB LOAD PARAMETER REG 1		03160SLA
00002A	4100 30CE		00004	32 *	LA 0,MRCREC LOAD PARAMETER REG 0		
00002E	58F0 1030		00030	33 *	L 15,4810,11 LOAD GET ROUTINE ADDR.		
000032	05EF			34 *	BALR 14,15 LINK TO GET ROUTINE		
000034	1888			35 *	SR 11,11		
000036	5A80 38DA		00BEU	36 *	STORE FOR LATER CHECKING		03162SLA
00003A	D204 38CF		00RD5	37 *	MVC HOLD,HLNGTH		03164SLA
000040	DC04 38CF		00RD5	38 *	TR HOLD,TABLE2		03170SLA
000046	F274 3AE2		00AE8	39 *	PACK PACKED,HOLD		03180SLA
00004C	4F70 3AE2		00AE8	40 *	CVB 7,PACKED		03190SLA
000050	18CC			41 *	SR 12,12		03200SLA
000052	4150 304A		00H50	42 *	LA 5,OUTDCB		03202SLA
000054				43 *	USING INADCB,5		04112SLA
000056	4070 5052		00052	44 *	STH 7,DCBLRECL		04113SLA
				45 *	*	NEED TO GET LENGTH IN DCB RECORD	04115SLA
				46 *	*	HAVE FOUND LENGTH, NOW NEED TO TRANS	04120SLA
00005A	1B99			47 *	SR 9,9		04130SLA
00005C	4190 0100		00100	48 *	LA 9,256(10)		04140SLA
000060	47F0 305E		00064	49 *	B A4190		04150SLA
				50 *	*	CLEAR 9	04160SLA
				51 *	*	PUT 256 IN 9	04170SLA
000064	41A0 30CE		00004	52 *	LA 10,MRCREC		04180SLA
000068	1887			53 *	LR 3,7		04190SLA
00006A	1879			54 *	SR 7,9		04200SLA
00006C	47C0 308A		00090	55 *	RC 12,A5070		04210SLA
000070	47F0 306E		00074		B A5000	IF 0 OR LESS, USE THE REMAINDER	04220SLA
						OTHERWISE, TRANSLATE 256 POSITIONS	04222SLA

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FIGURE A.1, cont.

LCC	OBJECT	CURE	ADDR1	ADDR2	STMT	SOURCE	STATEMENT	FOIREF69	8/06/70
0009E8	000000000000000000				110	TABL2	DC 19X*00*		06110SLA
0009F8	13				111		DC X*13*		06120SLA
0009FC	000000000000000000				112		DC 8X*00*	THIS IS TAPE MARK	06130SLA
000A04	1C				113		DC X*1C*	EOF	06140SLA
000A05	1D				114		DC X*1D*	EOF	06150SLA
000A06	1E				115		DC X*1E*	FIELD TERMINATOR	06160SLA
000A07	1F				116		DC X*1F*	DELIMITER	06170SLA
000A08	40				117		DC C*1*		06180SLA
000A09	4B				118		DC C*1*		06190SLA
000A0A	7D				119		DC C*1*		06200SLA
000A0B	7B				120		DC C*1*		06210SLA
000A0C	5B				121		DC C*1*		06220SLA
000A0D	40				122		DC C*1*		06230SLA
000A0E	5C				123		DC C*1*		07000SLA
000A0F	7D				124		DC C*1*		07010SLA
000A10	4D				125		DC C*1*		07020SLA
000A11	5D				126		DC C*1*		07030SLA
000A12	5C				127		DC C*1*		07040SLA
000A13	4E				128		DC C*1*		07050SLA
000A14	6B				129		DC C*1*		07060SLA
000A15	60				130		DC C*1*		07070SLA
000A16	4B				131		DC C*1*		07080SLA
000A17	61				132		DC C*1*		07090SLA
000A18	F0				133		DC C*0*		07100SLA
000A19	F1				134		DC C*1*		07110SLA
000A1A	F2				135		DC C*2*		07120SLA
000A1B	F3				136		DC C*3*		07130SLA
000A1C	F4				137		DC C*4*		07140SLA
000A1D	F5				138		DC C*5*		07150SLA
000A1E	F6				139		DC C*6*		07160SLA
000A1F	F7				140		DC C*7*		07170SLA
000A20	F8				141		DC C*8*		07180SLA
000A21	F9				142		DC C*9*		07190SLA
000A22	6B				143		DC C*1*	SUBSTITUTE COMMA FOR COLON	07200SLA
000A23	66				144		DC C*1*	SUBSTITUTE COMMA FOR SEMICOLON	07210SLA
000A24	40				145		DC C*1*		07220SLA
000A25	7E				146		DC C*1*		07230SLA
000A26	40				147		DC C*1*		08000SLA
000A27	4B				148		DC C*1*		08010SLA
000A28	7C				149		DC C*1*		08020SLA
000A29	C1				150		DC C*1*		08030SLA
000A2A	C2				151		DC C*1*		08040SLA
000A2B	C3				152		DC C*1*		08050SLA
000A2C	C4				153		DC C*1*		08060SLA
000A2D	C5				154		DC C*1*		08070SLA
000A2E	C6				155		DC C*1*		08080SLA
000A2F	C7				156		DC C*1*		08090SLA
000A30	C8				157		DC C*1*		08100SLA
000A31	C9				158		DC C*1*		08110SLA
000A32	D1				159		DC C*1*		08120SLA
000A33	02				160		DC C*1*		08130SLA
000A34	03				161		DC C*1*		08140SLA
000A35	04				162		DC C*1*		08150SLA
000A36	05				163		DC C*1*		08160SLA
000A37	06				164		DC C*1*		08170SLA

FIGURE A.1, cont.

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LOC	OBJECT CODE	ADDR1 ADDR2	STMT	SOURCE STATEMENT	FOI/FER69	8/06/70
000A38 07			165	DC C*P*		08180SLA
000A39 08			166	DC C*Q*		08190SLA
000A3A 09			167	DC C*R*		08200SLA
000A3B E2			168	DC C*S*		08210SLA
000A3C E3			169	DC C*T*		08220SLA
000A3D E4			170	DC C*U*		08230SLA
000A3E E5			171	DC C*V*		09000SLA
000A3F E6			172	DC C*W*		09010SLA
000A40 E7			173	DC C*X*		09020SLA
000A41 E8			174	DC C*Y*		09030SLA
000A42 E9			175	DC C*Z*		09040SLA
000A43 61			176	DC C*Z*		09050SLA
000A44 40			177	DC C*Z*		09060SLA
000A45 61			178	DC C*Z*		09070SLA
000A46 404040			179	DC C*Z*		09080SLA
000A47 C1			180	DC C*A*		09090SLA
000A48 C2			181	DC C*B*		09100SLA
000A49 C3			182	DC C*C*		09110SLA
000A4A C4			183	DC C*D*		09120SLA
000A4B C5			184	DC C*E*		09130SLA
000A4C C6			185	DC C*F*		09140SLA
000A4D C7			186	DC C*G*		09150SLA
000A4E C8			187	DC C*H*		09160SLA
000A51 C9			188	DC C*I*		09170SLA
000A52 D1			189	DC C*J*		09180SLA
000A53 D2			190	DC C*K*		09190SLA
000A54 D3			191	DC C*L*		09200SLA
000A55 D4			192	DC C*M*		09210SLA
000A56 D5			193	DC C*N*		09220SLA
000A57 D6			194	DC C*O*		09230SLA
000A58 D7			195	DC C*P*		10000SLA
000A59 D8			196	DC C*Q*		10010SLA
000A5A D9			197	DC C*R*		10020SLA
000A5B E2			198	DC C*S*		10030SLA
000A5C E3			199	DC C*T*		10040SLA
000A5D E4			200	DC C*U*		10050SLA
000A5E E5			201	DC C*V*		10060SLA
000A5F E6			202	DC C*W*		10070SLA
000A60 E7			203	DC C*X*		10080SLA
000A61 E8			204	DC C*Y*		10090SLA
000A62 E9			205	DC C*Z*		10100SLA
000A63 4C4040404040			206	DC C*Z*		10100SLA
000A68			207	PACKED DS D		10102SLA
			208	INDCB DCB		X10120SLA
				DDNAME=INDU,DSORG=PS,RECFM=U,EROPT=SKP,EODAD=ENDJOB,MACRF=GM		10122SLA
DATA CONTROL BLOCK						
000AF0			210**	ORG *-0 TO ELIMINATE UNUSED SPACE		
000AF0			211**	DS OF ORIGIN ON WORD BOUNDARY		
000AF0			213**/INDCB	ORG *-0 TO ORIGIN GENERATION		
000AF0			214**	ORG *-0 TO ORIGIN GENERATION		
			216**	DIRECT ACCESS DEVICE INTERFACE		

FIGURE A.1, cont.

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LCC	OBJECT CODE	ADDRESS	2	STMT	SOURCE STATEMENT	FOI/FER#69	8/06/70
000AF3	0000000000000000			218+	DC	BL16*0* FDAD,DVTBL	
000BC0	00000000			219+	DC	A(0) KEVLC,DEV,T,TRHAL	
				221**		COMMON ACCESS METHOD INTERFACE	
000B04	00			223+	OC	AL1(0) BUFNO	
000B05	00000001			224+	OC	AL3(1) BUFCD	
000B08	00000			225+	DC	AL2(0) BUFL	
000B0A	4000			226+	DC	BL2*0100000000000000* DSORG	
000B0C	000000001			227+	OC	A(1) INBND	
				229**		FOUNDATION EXTENSION	
000B10	00			231+	OC	BL1*00000000* BTEK,BFALN,HIARCHY	
000B11	000004			232+	OC	AL3(ENDJOB) EDOAO	
000B14	00			233+	OC	BL1*11000000* RECFM	
000B15	0000000			234+	DC	AL3(0) EXLSI	
				236**		FOUNDATION BLOCK	
000B18	C905C4C4+0404040			238+	OC	CL8*IND0* DDNAME	
000B20	02			239+	OC	BL1*000000010* DFLGS	
000B21	00			240+	DC	BL1*00000000* IFLG	
000B22	5000			241+	DC	BL2*0101000000000000* NACR	
				243**		BSAM-BPAY-QSAM INTERFACE	
000B24	00			245+	DC	BL1*00000000* RERI	
000B25	000001			246+	DC	AL3(1) CHECK, GERR, PERR	
000B28	00000001			247+	DC	A(1) SYNAD	
000B2C	0000			248+	OC	H*0* CIN01, CIN02	
000B2E	0000			249+	OC	AL2(0) BLKSIZE	
000B30	00000000			250+	OC	F*0* WCPD, WCPL, OFFSR, OFFSW	
000B34	00000001			251+	DC	A(1) INBA	
000B38	00			252+	DC	AL1(0) MCP	
000B39	000001			253+	DC	AL3(1) EUBR, EUBAD	
				255**		QSAM INTERFACE	
000B3C	00000001			257+	OC	A(1) RECAD	
000B40	0000			258+	OC	H*0* QSA\$	
000B42	0000			259+	OC	AL2(0) LRECL	
000B44	40			260+	DC	BL1*01000000* EROPT	
000B45	000001			261+	DC	AL3(1) CNTRL	
000B46	00000000			262+	DC	F*0* PRECL	
000B4C	00000001			263+	OC	A(1) EDR	
				264*	*		10140SLA 10150SLA
000B45				265	OUTDCB	DCB DDNAME=OUT00,DSORG=PS,RECFM=U,EROPT=ABE,MACRF=PM	
				267**		DATA CONTROL BLOCK	
000B50				268**			
000B50				269+	ORG	*-0 TO ELIMINATE UNUSED SPACE	
000B50				270*OUTDCB	DS	OF ORIGIN ON WORD BOUNDARY	
000B50				271+	ORG	*+0 TO ORIGIN GENERATION	

FIGURE A.1, cont.

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LCC - OBJECT CODE	ADDR1	ADDR2	STMT	SOURCE STATEMENT	FOI/FEB69	8/06/70
DIRECT ACCESS DEVICE INTERFACE						
000850	0000000000000000		273**	DC BL16*0* FIAD,DTBL		
000860	00000000		276*	DC A10) KEYLE,DEVT,T3BAL		
COMMON ACCESS METHOD INTERFACE						
000864	00		280*	DC A11(0) RUENO		
000865	000001		281*	DC A13(1) BUFCB		
000868	0000		282*	DC A12(0) BUFL		
00085A	4000		283*	DC BL2*0100000000000000* D5ORG		
00086C	00010001		284*	DC A11) IOBAD		
FOUNDATION EXTENSION						
000870	00		288*	DC BL1*00000000* OFTEK,9FALN,HIARCHY		
000871	000001		289*	DC A13(1) F0BAD		
000874	00		290*	DC BL1*11000000* RECFM		
000875	000000		291*	DC A13(0) EXLST		
FOUNDATION BLOCK						
000878	06E4F3C4C4404040		295*	DC CL8*0UTDD* DENAME		
000880	02		296*	DC BL1*00000010* OFLGS		
000881	00		297*	DC BL1*00000000* I LG		
000882	0C50		298*	DC BL2*000000001010000* MACR		
BSAM-BPA4-QSAM INTERFACE						
000884	00		302*	DC RL1*00000000* RER1		
000885	000001		303*	DC A13(1) CHECK, GERU, PERR		
000886	00000001		304*	DC A11) SYNAD		
00088C	0000		305*	DC H*0* CIND1, CIND2		
00089E	0000		306*	DC A12(0) BLKSIZE		
00089C	00000000		307*	DC F*0* MCP0, MCP1, OFFSR, OFFSW		
000894	00000001		308*	DC A11) I03A		
000898	00		309*	DC A11(0) NCP		
000899	000001		310*	DC A13(1) E0RR, F0RA0		
QSAM INTERFACE						
00089C	00000001		312**			
0008A0	0000		314*	DC A11) RECAD		
0008A2	0000		315*	DC H*0* QSAS		
0008A4	20		316*	DC A12(0) LRECL		
0008A4	20		317*	DC BL1*00100000* ER0PT		
0008A5	000001		318*	DC A13(1) CNTPL		
0008A8	00000000		319*	DC F*0* PRECL		
0008AC	00000001		320*	DC A11) E0B		
			321	DCB0 D5ORG=PS,DEVD=DA		10152SLA
DCB SYMBOLIC DEFINITION FOR PHYSICAL SEQUENTIAL						
000000			323**			
			324**			
000000			326* IHADCB	USECT		

FIGURE A.1, cont.

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LOC	OBJECT CODE	ADDR1	ADDR2	STMT	SOURCE STATEMENT	FOI/FEB/69	8/06/70
DEVICE INTERFACES							
DIRECT ACCESS DEVICES							
328**							
000000							
000004					332+DCBRELAD DS A		
000005					333+DCRKEYCN DS AL1		
00000C					334+DCRFAD DS CL8		
00000C					335+ ORG *-1		
00000C					336+DCRUVTL DS A		
000010					337+ DS H		
000012					338+DCBTRBAL DS AL2		
339**							
ACCESS METHOD COMMON INTERFACE							
341+ ORG IHADCB+16							
000010					342+DCRKEYLE DS BL1		
000011					343+DCRDEVT DS DBL1		
000011					344+DCBREL DS AL3		
000014					345+DCRUFNO DS DBL1		
000014					346+DCRBUFCB DS A		
000018					347+DCRBUFL DS H		
00001A					348+DCRDSORG DS BL2		
00001C					349+DCRDBAD DS A		
351**							
FOUNDATION EXTENSION							
000020					353+DCRBFTEK DS DBL1		
000020					354+DCRBFALN DS DBL1		
000020					355+DCRBDAD DS A		
000024					356+DCRCECM DS DBL1		
000024					357+DCRXLST DS A		
360**							
FOUNDATION BEFORE OPEN							
362+ ORG IHADCB+40							
000028					363+DCBUDNAM DS CL8		
000030					364+DCRFLGS DS BL1		
000031					365+DCBIFLG DS BL1		
000032					366+DCBMACR DS BL2		
368**							
FOUNDATION AFTER OPEN							
370+ ORG IHADCB+40							
000028					371+DCRTIDT DS BL2		
00002A					372+DCBMACRF DS BL2		
00002C					373+DCBIFLGS DS DBL1		
00002C					374+DCRDEBAD DS A		
000030					375+DCBREAR DS OA		
000030					376+DCRWRITE DS OA		
000030					377+DCRGET DS OA		
000030					378+DCRPUT DS OA		
380**							
QSAW-BSA4-BPAY COMMON INTERFACE							
000034					382+ ORG IHADCB+52		

FIGURE A.1., cont.

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FOIEB69 8/06/70

LCC OBJECT CODE ADDR1 ADDR2 STMT SOURCE STATEMENT

000034		383+DCB0PTCD	OS	OBL1
000034		384+DCB0ERR	DS	OA
000034		385+DCB0PERR	DS	OA
000034		386+UCBCHECK	DS	A
000038		387+	ORG	IHAOCB+56
000038		388+DCB10HL	DS	OBL1
000038		389+DCB0SYNAD	DS	A
00003C		390+	ORG	IHAOCB+60
00003C		391+DCBCINDI	DS	BL1
00003C		392+DCBCIND2	DS	BL1
00003E		393+DCB8LKS1	DS	H
000040		394+	ORG	IHAOCB+64
000040		395+DCB8MCPQ	DS	BL1
000041		396+DCB8MCP	DS	BL1
000042		397+DCB0FFSR	DS	BL1
000043		398+DCB0FFSW	DS	BL1
000044		399+DCB10BA	DS	A

BSAM-RPAM INTERFACE

401**

000048		403+DCBNCP	DS	OBL1
000048		404+DCBEOBR	DS	A
00004C		405+DCBEOBW	DS	A
000050		406+DCB0IRCT	OS	H
000052		407+DCBLRECL	DS	H
000054		408+	ORG	IHAOCB+84
000054		409+DCB0CNTRL	DS	OA
000054		410+DCB0NOTE	DS	OA
000054		411+DCB0PINT	DS	A

QSAM INTERFACE

413**

000048		415+	ORG	IHAOCB+72
000048		416+DCBLCCW	OS	OA
000048		417+DCB0BAD	DS	A
00004C		418+DCB0CCW	DS	OA
00004C		419+DCB0RECAD	OS	A
000050		420+DCB0SWS	DS	AL2
000054		421+	ORG	IHAOCB+84
000054		422+DCB0EROPT	DS	OBL1
00005A		423+	ORG	IHAOCB+90
00005A		424+DCB0PRECL	OS	AL2
00005C		425+DCB0E0B	OS	A

10190SLA

427 ENO

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LEVEL 1 JAN 67

CUBOL F

DATE AUG 7, 1970

CORRELATION TABLE PROGRAM -- ANALYSIS AND FORMAT
FIGURE A.2

1

000001	IDENTIFICATION DIVISION.	VEGP0100
000002	PROGRAM-ID.	VEGP0100
000003	AUTHOR.	VEGP0100
000004	INSTALLATION.	VEGP0100
000005	DATE-WRITTEN.	VEGP0100
000006	DATE-COMPILED.	VEGP0100
000007	REMARKS.	VEGP0100
000008	ENVIRONMENT DIVISION.	VEGP0100
000009	CONFIGURATION SECTION.	VEGP0100
000010	SOURCE-COMPUTER.	VEGP0100
000011	OBJECT-COMPUTER.	VEGP0100
000012	INPUT-OUTPUT SECTION.	VEGP0100
000013	FILE-CONTROL.	VEGP0100
000014	SELECT BASE-MSTR	VEGP0100
000015	SELECT CTL-CARD	VEGP0100
000016	SELECT R0	VEGP0100
000017	SELECT R1	VEGP0100
000018	SELECT R2	VEGP0100
000019	SELECT R3	VEGP0100
000020	SELECT R4	VEGP0100
000021	SELECT R5	VEGP0100
000022	SELECT R6	VEGP0100
000023	SELECT R7	VEGP0100
000024	SELECT R8	VEGP0100
000025	SELECT R9	VEGP0100
000026	SELECT R10	VEGP0100
000027	SELECT R11	VEGP0100
000028	DATA DIVISION.	VEGP0100
000029	FILE SECTION.	VEGP0100
000030	FD BASE-MSTR	VEGP0100
000031	RECORDING MODE IS U	VEGP0100
000032	LABEL RECORDS ARE STANDARD	VEGP0100
000033	DATA RECORD IS DATA-BASE.	VEGP0100
000034	DATA-BASE	VEGP0100
000035	CTL-CARD	VEGP0100
000036	RECORDING MODE IS F	VEGP0100
000037	RECORD CONTAINS 80 CHARACTERS	VEGP0100
000038	BLOCK CONTAINS 0 RECORDS	VEGP0100
000039	LABEL RECORDS ARE LIMITED	VEGP0100
000040	DATA RECORD IS CTL-INFO.	VEGP0100
000041	CTL-INFO.	VEGP0100
000042	05 IDENT-CTL	VEGP0100
000043	05 GOOD-CTL	VEGP0100
000044	05 FILLER	VEGP0100
000045	05 TAG1	VEGP0100
000046	05 FILLER	VEGP0100
000047	05 TAG2	VEGP0100
000048	05 FILLER	VEGP0100
000049	05 TAG3	VEGP0100
000050	05 FILLER	VEGP0100
000051	05 TAG4	VEGP0100
000052	05 FILLER	VEGP0100
000053	05 TAG5	VEGP0100
000054	05 FILLER	VEGP0100

FIGURE A.2, cont.

00112	005120	LABEL RECORDS ARE STANDARD	VEGP0106
00113	005130	DATA RECORD IS PRT7.	VEGP0106
00114	005140 01	PRT7	VEGP0106
00115	005150 FD	R8	VEGP0106
00116	005160	RECORDING MODE IS F	VEGP0106
00117	005170	RECORD CONTAINS 133 CHARACTERS	VEGP0106
00118	005180	BLOCK CONTAINS 0 RECORDS	VEGP0106
00119	005190	LABEL RECORDS ARE STANDARD	VEGP0106
00120	005200	DATA RECORD IS PRT8.	VEGP0106
00121	005210 01	PRT8	VEGP0106
00122	006010 FD	R9	VEGP0106
00123	006020	RECORDING MODE IS F	VEGP0106
00124	006030	RECORD CONTAINS 133 CHARACTERS	VEGP0106
00125	006040	BLOCK CONTAINS 0 RECORDS	VEGP0106
00126	006050	LABEL RECORDS ARE STANDARD	VEGP0106
00127	006060	DATA RECORD IS PRT9.	VEGP0106
00128	006070 01	PRT9	VEGP0106
00129	006080 FD	P10	VEGP0106
00130	006090	RECORDING MODE IS F	VEGP0106
00131	006100	RECORD CONTAINS 133 CHARACTERS	VEGP0106
00132	006110	BLOCK CONTAINS 0 RECORDS	VEGP0106
00133	006120	LABEL RECORDS ARE STANDARD	VEGP0106
00134	006130	DATA RECORD IS PRT10.	VEGP0106
00135	006140 01	PRT10	VEGP0106
00136	006150 FD	P11	VEGP0106
00137	006160	RECORDING MODE IS F	VEGP0106
00138	006170	RECORD CONTAINS 133 CHARACTERS	VEGP0106
00139	006180	BLOCK CONTAINS 0 RECORDS	VEGP0106
00140	006190	LABEL RECORDS ARE STANDARD	VEGP0106
00141	006200	DATA RECORD IS PRT11.	VEGP0106
00142	006210 01	PRT11	VEGP0106
00143	007010 SD	SORT-THESE	VEGP0106
00144	007020	RECORDING MODE IS F	VEGP0106
00145	007030	DATA RECORD IS REAL-REC.	VEGP0106
00146	007040 01	REAL-REC.	VEGP0106
00147	007041	05 PRIME6	VEGP0106
00148	007042	05 FILLER	VEGP0106
00149			VEGP0106
00150			VEGP0106
00151	007100	WORKING-STORAGE SECTION.	VEGP0106
00152	007110 77	FILLER VALUE *WORK AREA STARTS HERE*	VEGP0106
00153	010010 77	DEWEY-SUBS COMPUTATIONAL	VEGP0106
00154	010020 77	SAVE-EASE VALUE 0	VEGP0106
00155	010030 77	DIREC-BMP VALUE 0	VEGP0106
00156	010040 77	VARI-BMP VALUE 0	VEGP0106
00157	010050 77	PULL-BMP VALUE 0	VEGP0106
00158	010060 77	REC-LOC VALUE 0	VEGP0106
00159	010070 77	TBL-SUBS VALUE 0	VEGP0106
00160	010080 77	SAV-NAJ-LTR	VEGP0106
00161	010090 77	SAV-GRID-TOT	VEGP0106
00162	010100 77	IST-REC VALUE 1	VEGP0106
00163	010110 77	IST-MIN VALUE 1	VEGP0106
00164	010120 77	RPT10-SWT VALUE 0	VEGP0106
00165	010130 77	RPT11-SWT VALUE 0	VEGP0106
00166	010140 77	RPT12-SWT VALUE 0	VEGP0106
00167	010150 77	RPT13-SWT VALUE 0	VEGP0106
00168	010160 77	RPT14-SWT VALUE 0	VEGP0106

FIGURE A.2, cont.

00169	010170	77	RPT15-SWT	VALUE 0	PICTURE 9.	VEGP0106
00170	010180	77	RPT16-SWT	VALUE 0	PICTURE 9.	VEGP0106
00171	010190	77	RPT17-SWT	VALUE 0	PICTURE 9.	VEGP0106
00172	010200	77	RPT18-SWT	VALUE 0	PICTURE 9.	VEGP0106
00173	010210	77	RPT19-SWT	VALUE 0	PICTURE 9.	VEGP0106
00174	011010	77	TIME		PICTURE 9(8).	VEGP0106
00175	011020	77	JDATE		PICTURE 9(5).	VEGP0106
00176	011030	77	PAGCT1	VALUE 0	PICTURE 999.	VEGP0106
00177	011040	77	PAGCT2	VALUE 0	PICTURE 999.	VEGP0106
00178	011050	77	PAGCT3	VALUE 0	PICTURE 999.	VEGP0106
00179	011060	77	PAGCT4	VALUE 0	PICTURE 999.	VEGP0106
00180	011070	77	PAGCT5	VALUE 0	PICTURE 999.	VEGP0106
00181	011080	77	PAGCT6	VALUE 0	PICTURE 999.	VEGP0106
00182	011090	77	PAGCT7	VALUE 0	PICTURE 999.	VEGP0106
00183	011100	77	PAGCT8	VALUE 0	PICTURE 999.	VEGP0106
00184	011110	77	PAGCT9	VALUE 0	PICTURE 999.	VEGP0106
00185	011120	77	PAGCT10	VALUE 0	PICTURE 999.	VEGP0106
00186	011130	77	FIRST-RETURN	VALUE 1	PICTURE 9.	VEGP0106
00187	011140	77	TEMP-REC-CT	VALUE 0	PICTURE 9(5).	VEGP0106
00188	011150	77	PRT-SUBS	COMPUTATIONAL	PICTURE 9(5).	VEGP0106
00189	011160	77	OVERALL	VALUE 0	PICTURE 9(5).	VEGP0106
00190	011170	77	LINE-TOT-SAV		PICTURE 9(6).	VEGP0106
00191	011180	77	PCT-RESULT		PICTURE 999V9.	VEGP0106
00192	011190	77	BIG-TOT		PICTURE 9(5).	VEGP0106
00193	011200	77	TENX	VALUE 0 COMPUTATIONAL	PICTURE 999.	VEGP0106
00194	025010	01	WORK-MAST-A.		VEGP0106	
00195	025020	05	LEADER.		VEGP0106	
00196	025030	10	TOT-LGTH		PICTURE 9(5).	VEGP0106
00197	025040	10	FILLER		PICTURE X(7).	VEGP0106
00198	025050	10	BASE-ADR		PICTURE 9(5).	VEGP0106
00199	025060	10	FILLER		PICTURE X(7).	VEGP0106
00200	025070	05	DIRECTORY	OCCURS 207 TIMES.	VEGP0106	
00201	025080	10	TAG		PICTURE 9(3).	VEGP0106
00202	025090	10	LGTH		PICTURE 9(4).	VEGP0106
00203	025100	10	DISPL		PICTURE 9(5).	VEGP0106
00204	025110	01	WORK-MAST-B	REDEFINES WORK-MAST-A.	VEGP0106	
00205	025120	05	REC1	OCCURS 2508 TIMES	PICTURE X.	VEGP0106
00206	025130	01	PULLED-VARIES.		VEGP0106	
00207	025140	05	VARI-FLD	OCCURS 5 TIMES.	VEGP0106	
00208	025145	10	VARI-TAG		PICTURE 9(3).	VEGP0106
00209	025150	10	VARI-FLDA	COMPUTATIONAL	PICTURE S9(5).	VEGP0106
00210	025160	10	VARI-FLDB.		PICTURE X.	VEGP0106
00211	025170	15	VARI-FLDC	OCCURS 100 TIMES	PICTURE X.	VEGP0106
00212	025180	01	CTL-SELECTS	VALUE ZERUS	PICTURE X(15).	VEGP0106
00213	025190	01	SAVE-SELECTS	REDEFINES CTL-SELECTS.	VEGP0106	
00214	025200	05	SELEC-TAG	OCCURS 5 TIMES	PICTURE 999.	VEGP0106
00215	026010	01	SORT-REC.		VEGP0106	
00216	026020	05	S-POS1		PICTURE 9.	VEGP0106
00217	026030	05	S-POS2-3-4		PICTURE XXX.	VEGP0106
00218	026040	05	S-POS5		PICTURE 9.	VEGP0106
00219	026050	05	S-POS6		PICTURE 9.	VEGP0106
00220	026060	01	SAVED-SORT.		VEGP0106	

FIGURE A.2, cont.

00226	026070	05 PREV1	PICTURE 9.	VEGP0106
00227	026080	05 PREV2-3-4	PICTURE XXX.	VEGP0106
00228	026090	05 PREV-MIN	PICTURE 9.	VEGP0106
00229	026100	05 PREV6	PICTURE 9.	VEGP0106
00230	026101 01	REDEF-SAVED-SORT REDEFINES SAVED-SORT.		VEGP0106
00231	026102	05 RDF-1	PICTURE 9.	VEGP0106
00232	026103	05 RDF-2-3.		VEGP0106
00233	026104	10 RDF2	PICTURE X.	VEGP0106
00234	026105	10 RDF3	PICTURE X.	VEGP0106
00235	026106	05 RDF-4-5.		VEGP0106
00236	026107	10 RDF4	PICTURE 9.	VEGP0106
00237	026108	10 RDF5	PICTURE 9.	VEGP0106
00238	026109	05 RDF-RDF45	PICTURE 99.	VEGP0106
00239	02611A	05 RDF-6	PICTURE 9.	VEGP0106
00240				
00241	026110 01	BILO-OUTREC.		VEGP0106
00242	026120	05 POS1	PICTURE 9.	VEGP0106
00243	026130	05 POS2-3.		VEGP0106
00244	026140	10 POS2	PICTURE X.	VEGP0106
00245	026150	10 POS3	PICTURE X.	VEGP0106
00246	026160	05 POS4-5.		VEGP0106
00247	026170	10 POS4	PICTURE X.	VEGP0106
00248	026180	10 POS5	PICTURE X.	VEGP0106
00249	026190	05 POS6	PICTURE 9.	VEGP0106
00250				
00251	027010 01	LC-HOLD.		VEGP0106
00252	027020	05 MAJ-LTR	PICTURE X.	VEGP0106
00253	027030	05 MIN-LTR	PICTURE X.	VEGP0106
00254	027040 01	DEWEY-HOLD.		VEGP0106
00255	027050	05 MAJ-NUM	PICTURE 9.	VEGP0106
00256	027060	05 MIN-NUM	PICTURE 9.	VEGP0106
00257	027070 01	REDEF-DEWEY-HOLD	REDEFINES DEWEY-HOLD.	VEGP0106
00258	027080	05 MAJ-AN	PICTURE X.	VEGP0106
00259	027090	05 MIN-AN	PICTURE X.	VEGP0106
00260	027100 01	DEWEY-NUMBER	REDEFINES REDEF-DEWEY-HOLD PICTURE 99.	VEGP0106
00261				
00262	027110 01	TBL-NUM-CTS	VALUE ZERO	VEGP0106
00263	027120 01	R-TBL-NUM-CTS	REDEFINES TBL-NUM-CTS.	VEGP0106
00264	027130	05 TBL-CT	OCCURS 100 TIMES	VEGP0106
00265	027131 01	TABLE-GROUPS	REDEFINES R-TBL-NUM-CTS.	VEGP0106
00266	027132	05 GRP-OF-10	OCCURS 10 TIMES.	VEGP0106
00267	027133	10 G0	PICTURE 9(5).	VEGP0106
00268	027134	10 G1	PICTURE 9(5).	VEGP0106
00269	027135	10 G2	PICTURE 9(5).	VEGP0106
00270	027136	10 G3	PICTURE 9(5).	VEGP0106
00271	027137	10 G4	PICTURE 9(5).	VEGP0106
00272	027138	10 G5	PICTURE 9(5).	VEGP0106
00273	027139	10 G6	PICTURE 9(5).	VEGP0106
00274	02714A	10 G7	PICTURE 9(5).	VEGP0106
00275	02714B	10 G8	PICTURE 9(5).	VEGP0106
00276	02714C	10 G9	PICTURE 9(5).	VEGP0106
00277				
00278	027140 C1	STAT-CTS.		VEGP0106
00279	027150	05 INRECS	VALUE 0	VEGP0106
00280	027160	05 OK-IN	VALUE 0	VEGP0106
00281	027170	05 NG-LC	VALUE 0	VEGP0106
00282	027180	05 NG-DWY	VALUE 0	VEGP0106

FIGURE A.2, cont.

00293	027140	05	DUP-LC	VALUE 0	PICTURE 9(6).	VEGP0106
00294	027200	05	DUP-SWY	VALUE 0	PICTURE 9(6).	VEGP0106
00285						
00286	028010 01	HEAD1.				VEGP0106
00287	023020	05	MAJ-MIN	VALUE , MAJOR ,	PICTURE X(8).	VEGP0106
00288	028010	05	FILLER	VALUE ,MATRIX ,	PICTURE X(8).	VEGP0106
00289	028040	05	HD15	VALUE SPACE	PICTURE X.	VEGP0106
00290	028050	05	HD16	VALUE SPACE	PICTURE X.	VEGP0106
00291	028060	05	FILLER	VALUE SPACE	PICTURE X(38).	VEGP0106
00292	029070	05	FILLER		PICTURE X(170) VALUE	VEGP0106
00293	023080		*WASHINGTON STATE LIBRARY*.			VEGP0106
00294	028090	05	FILLER	VALUE ,R.	PICTURE X.	VEGP0106
00295	028100	05	RPTNO	VALUE 20	PICTURE 99.	VEGP0106
00296	028110	05	FILLER	VALUE ,06385*	PICTURE X(5).	VEGP0106
00297						
00298	028120 01	HEAD2.				VEGP0106
00299	028130	05	FILLER	VALUE SPACE	PICTURE XX.	VEGP0106
00300	028140	05	RPTMO		PICTURE Z9.	VEGP0106
00301	023150	05	FILLER	VALUE ,-	PICTURE X.	VEGP0106
00302	028160	05	RPTDY		PICTURE Z9.	VEGP0106
00303	028170	05	FILLER	VALUE ,-	PICTURE X.	VEGP0106
00304	028180	05	RPTYR		PICTURE 99.	VEGP0106
00305	028190	05	FILLER	VALUE SPACE	PICTURE X(23).	VEGP0106
00306	028200	05	FILLER		PICTURE X(92) VALUE	VEGP0106
00307	028210		*CORRELATION MATRIX COMPARING DEWEY DECIMAL AND LC NUMBER*		VEGP0106	VEGP0106
00308	028220-		*NG SYSTEMS*.			VEGP0106
00309	028230	05	FILLER	VALUE ,PAGE ,	PICTURE X(5).	VEGP0106
00310	028240	05	PAGENUM		PICTURE ZZ9.	VEGP0106
00311						
00312	029010 01	HEAD3.				VEGP0106
00313	029020	05	FILLER		PICTURE X(96) VALUE	VEGP0106
00314	029030		, LC DEWEY 0 DEWEY 1 DEWEY 2 DEWEY 3		VEGP0106	VEGP0106
00315	029040-		*DEWEY 4 DEWEY 5 DEWEY 6 DEWEY 7		VEGP0106	VEGP0106
00316	029050	05	FILLER		PICTURE X(37) VALUE	VEGP0106
00317	029060		*EY 7 DEWEY 8 DEWEY 9 TOTAL*		VEGP0106	VEGP0106
00318						
00319	029061 01	4K-PRTI-PARTIAL.				VEGP0106
00320	029062	05	WITHOUT-TOT		PICTURE X(127).	VEGP0106
00321	029063	05	FILLER		PICTURE X(6).	VEGP0106
00322	029070 01	WK-PRINT1	REDEFINES WK-PRTI-PARTIAL.			VEGP0106
00323	029080	05	FILLER		PICTURE XXXX.	VEGP0106
00324	029090	05	LC-X		PICTURE XXX.	VEGP0106
00325	029100	05	DTL-COL-1 OCCURS 10 TIMES.			VEGP0106
00326	029110	10	TOT-PART		PICTURE Z(5).	VEGP0106
00327	029120	10	PCT-PART-1		PICTURE ZZ.9.	VEGP0106
00328	029130	10	PCT-CHAR-1		PICTURE XX.	VEGP0106
00329	029140	05	LINE-TOT		PICTURE Z(6).	VEGP0106
00330						
00331	029150 01	WK-PRINT2.				VEGP0106
00332	029160	05	FILLER		PICTURE X(12).	VEGP0106
00333	029200	05	DTL-COL-2 OCCURS 10 TIMES.			VEGP0106
00334	029210	10	PCT-PART-2		PICTURE ZZ.9.	VEGP0106
00335	029220	10	PCT-CHAR-2		PICTURE X(7).	VEGP0106
00336	029230	05	FILLER		PICTURE X.	VEGP0106
00337						
00338	033010 01	4K-PRINT3.				VEGP0106
00339	033020	05	FILLER	VALUE , TOTAL ,	PICTURE X(7).	VEGP0106

FIGURE A.2, cont.

3

00397	051020	SORT SORT-THESE ASCENDING KEY PRIME6,	VEGP0106
00398	051030	INPUT PROCEDURE BILD-THE-RECS,	VEGP0106
00399	051040	OUTPUT PROCEDURE RETURN-THE-RECS.	VEGP0106
00400	051050	STOP RUN.	VEGP0106
00401			
00402	051060	HILD-THE-RECS SECTION.	VEGP0106
00403	051070	OPEN-MSTR.	VEGP0106
00404	051080	OPEN INPUT BASE-MSTR.	VEGP0106
00405	055051	OPEN OUTPUT R1.	
00406	055052	OPEN OUTPUT R2.	
00407	055053	OPEN OUTPUT R3.	
00408	055054	OPEN OUTPUT R4.	
00409	055055	OPEN OUTPUT R5.	
00410	055056	OPEN OUTPUT R6.	
00411	055057	OPEN OUTPUT R7.	
00412	055058	OPEN OUTPUT R8.	
00413	055059	OPEN OUTPUT R9.	
00414	055060	OPEN OUTPUT R10.	
00415	055061	OPEN OUTPUT R11.	
00416			
00417	**051090	READ-MSTR.	VEGP0106
00418	051100	READ BASE-MSTR AT END GO TO CLOSE-MSTR.	VEGP0106
00419	051110	ADD 1 TO INRECS.	VEGP0106
00420	051120	MOVE DATA-BASE TO WORK-MAST-A.	VEGP0106
00421	051130	PERFORM GET-THE-VERBLES THRU EXIT-VARY-GETS.	VEGP0106
00422	051140	MOVE SPACES TO LC-HOLD, DEWEY-HOLD.	VEGP0106
00423	051150	MOVE 1 TO PULL-BMP.	VEGP0106
00424	051160	CK-TAG050.	VEGP0106
00425	051170	IF VARI-TAG (PULL-BMP) NOT = 050 GO TO CK-5-50S.	VEGP0106
00426	051180	IF LC-HOLD NOT = SPACES ADD 1 TO DUP-LC, MOVE 1 TO PULL-BMP,	VEGP0106
00427	051190	GO TO CK-TAG082.	VEGP0106
00428	051200	MOVE VARI-FLDC (PULL-BMP, 5) TO MAJ-LTR.	VEGP0106
00429	051210	MOVE VARI-FLDC (PULL-BMP, 6) TO MIN-LTR.	VEGP0106
00430	052010	CK-5-50S.	VEGP0106
00431	052020	IF PULL-BMP = 5 ADD 1 TO PULL-BMP, GO TO CK-TAG050.	VEGP0106
00432	052030	IF LC-HOLD = SPACES ADD 1 TO NG-LC, GO TO READ-MSTR.	VEGP0106
00433	052040	MOVE 1 TO PULL-BMP.	VEGP0106
00434			
00435	052050	CK-TAG082.	VEGP0106
00436	052060	IF VARI-TAG (PULL-BMP) NOT = 082 GO TO CK-5-82S.	VEGP0106
00437	052070	IF DEWEY-HOLD NOT = SPACES ADD 1 TO DUP-DNY,	VEGP0106
00438	052080	GO TO GOOD-1-EACH.	VEGP0106
00439	052090	MOVE VARI-FLDC (PULL-BMP, 5) TO MAJ-AN.	VEGP0106
00440	052100	MOVE VARI-FLDC (PULL-BMP, 6) TO MIN-AN.	VEGP0106
00441	052110	IF DEWEY-NUMBER NOT NUMERIC MOVE SPACES TO DEWEY-HOLD GO	
00442	052111	TO CK-5-82S.	
00443	052112	IF DEWEY-NUMBER NEGATIVE MOVE SPACES TO DEWEY-HOLD.	
00444	052120	CK-5-82S.	
00445	052130	IF PULL-BMP = 5 ADD 1 TO PULL-BMP, GO TO CK-TAG082.	
00446	052140	IF DEWEY-HOLD = SPACES ADD 1 TO NG-DNY, GO TO READ-MSTR.	
00447			
00448	052150	GOOD-1-EACH.	VEGP0106
00449	052155	ADD 1 TO OK-IN.	VEGP0106
00450	**052157	IF MAJ-LTR = 1 PL GO TO COMPUTE-OVERALL7	TEMP
00451	052160	MOVE '0' TO RILD-OUTREC.	VEGP0106
00452	052170	MOVE MAJ-LTR TO POS2.	VEGP0106
00453	052180	MOVE 0 TO POS6.	VEGP0106

FIGURE A.2, cont.

00454	052190	MOVE BILD-OUTREC TO REAL-REC.	VEGP0106
00455	052200	RELEASE REAL-REC.	VEGP0106
00456	053010	MOVE MAJ-NUM TO POS5.	VEGP0106
00457	053020	MOVE 1 TO POS6.	VEGP0106
00458	053030	MOVE BILD-OUTREC TO REAL-REC.	VEGP0106
00459	053040	RELEASE REAL-REC.	VEGP0106
00460	053050	MOVE '1' TO BILD-OUTREC.	VEGP0106
00461	053060	MOVE LC-HOLD TO POS2-3.	VEGP0106
00462	053070	MOVE 0 TO POS6.	VEGP0106
00463	053080	MOVE BILD-OUTREC TO REAL-REC.	VEGP0106
00464	053090	RELEASE REAL-REC.	VEGP0106
00465	053100	MOVE DEWEY-HOLD TO POS4-5.	VEGP0106
00466	053110	MOVE 1 TO POS6.	VEGP0106
00467	053120	MOVE BILD-OUTREC TO REAL-REC.	VEGP0106
00468	053130	RELEASE REAL-REC.	VEGP0106
00469	053135	COMPUTE-OVERALL.	VEGP0106
00470	053140	COMPUTE DEWEY-SUBS = DEWEY-NUMBER + 1.	VEGP0106
00471	053150	ADD 1 TO TBL-CT (DEWEY-SUBS). ADD 1 TO OVERALL.	VEGP0106
00472	053160	GO TO READ-MSTR.	VEGP0106
00473			
00474	054010	GET-THE-VERBLES.	VEGP0106
00475	054020	MOVE ZEROS TO PULLED-VARIES.	VEGP0106
00476	054030	MOVE 25 TO REC-LOC.	VEGP0106
00477	054040	MOVE 1 TO DIREC-BMP, PULL-BMP.	VEGP0106
00478	054050	CK-DIREC-DUN.	VEGP0106
00479	054060	IF REC-LOC = BASE-ADR GO TO CK-NXT-TAG.	VEGP0106
00480	054070	EXIT-VARY-GETS. EXIT.	VEGP0106
00481			
00482	054080	CK-NXT-TAG.	VEGP0106
00483	054090	IF TAG (DIREC-BMP) = SELEC-TAG (1) OR SELEC-TAG (2) OR	VEGP0106
00484	054100	SELEC-TAG (3) OR SELEC-TAG (4) OR SELEC-TAG (5) NEXT	VEGP0106
00485	054110	SENTENCE ELSE GO TO BUMP-DIREC-FLD.	VEGP0106
00486	054120	COMPUTE SAVE-BASE = 1 + BASE-ADR + DISPL (DIREC-BMP).	VEGP0106
00487	054130	MOVE 1 TO VARI-BMP.	VEGP0106
00488	054135	MOVE TAG (DIREC-BMP) TO VARI-TAG (PULL-BMP).	VEGP0106
00489	054140	MOVE LGTH (DIREC-BMP) TO VARI-FLDA (PULL-BMP).	VEGP0106
00490	054150	MUV-VARY-BYTE.	VEGP0106
00491	054160	MOVE RECL (SAVE-BASE) TO VARI-FLDC (PULL-BMP, VARI-BMP).	VEGP0106
00492	054170	ADD 1 TO SAVE-BASE, ADD 1 TO VARI-BMP.	VEGP0106
00493	054180	IF VARI-BMP NOT VARI-FLDA (PULL-BMP) GO TO MUV-VARY-BYTE.	VEGP0106
00494	054190	IF PULL-BMP 4 GO TO EXIT-VARY-GETS.	VEGP0106
00495	054200	ADD 1 TO PULL-BMP.	VEGP0106
00496	054210	BUMP-DIREC-FLD.	VEGP0106
00497	054220	ADD 12 TO REC-LOC.	VEGP0106
00498	054230	GO TO CK-DIREC-OUN.	VEGP0106
00499			
00500	055010	CLOSE-MSTR.	VEGP0106
00501	055020	CLOSE BASE-MSTR, CTL-CARD.	VEGP0106
00502	055030	EXIT-SECT1. EXIT.	VEGP0106
00503			
00504	055040	RETURN-THE-RECS SECTION.	VEGP0106
00505	055050	UPEN-REPTS.	VEGP0106
00506	055065	MOVE SPACES TO WK-PRINT1, WK-PRINT2, PR13-TO-CLR.	VEGP0106
00507			
00508	055070	PEAD-SORTED.	VEGP0106
00509	055080	RETURN SORT-THESE AT END MOVE '999999' TO SORT-REC,	VEGP0106
00510	055090	GO TO CK-EQU-RECS.	VEGP0106

FIGURE A.2, cont.

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00511 005100 MOVE REAL-REC TO SORT-REC.
00512 005110 IF FIRST-RETURN = 1 MOVE 0 TO FIRST-RETURN, GO TO SAV-NEW-R.
00513 005120 CK-EQU-RECS.
00514 005130 IF SORT-REC = SAVED-SORT ADD 1 TO TEMP-REC-CT,
GO TO READ-SORTED.
00515 005140 IF PREV6 = 0 MOVE SPACES TO WITHOUT-TOT, MOVE TEMP-REC-CT TO
LINE-TOT, LINE-TOT-SAV, GO TO CLR-TEMP-CTR.
00516 005150 COMPUTE PRT-SUBS = PREV-MIN + 1.
00517 005160 MOVE TEMP-REC-CT TO TOT-PART (PRT-SUBS).
00518 005170 IF PREV1 = 0 GO TO PCT-ALIKE.
00519 005180 COMPUTE DEWEY-SUBS = RDF-RDF45 + 1.
00520 005190 COMPUTE PCT-RESULT ROUNDED =
(TEMP-REC-CT * 100) / LINE-TOT-SAV.
00521 005200 MOVE PCT-RESULT TO PCT-PART-1 (PRT-SUBS).
00522 005210 MOVE % TO PCT-CHAR-1 (PRT-SUBS).
00523 005220 COMPUTE PCT-RESULT ROUNDED =
(TEMP-REC-CT * 100) / TRL-CT (DEWEY-SUBS).
00524 005230 MOVE PCT-RESULT TO PCT-PART-2 (PRT-SUBS).
00525 005240 MOVE % TO PCT-CHAR-2 (PRT-SUBS).
00526 005250 GO TO CK-POS234.
00527 005260 PCT-ALIKE.
00528 005270 COMPUTE PCT-RESULT ROUNDED =
(TEMP-REC-CT * 100) / OVERALL.
00529 005280 MOVE PCT-RESULT TO PCT-PART-1 (PRT-SUBS).
00530 005290 MOVE PCT-RESULT TO PCT-PART-2 (PRT-SUBS).
00531 005300 MOVE % TO PCT-CHAR-1 (PRT-SUBS), PCT-CHAR-2 (PRT-SUBS).
00532 005310 CK-POS234.
00533 005320 IF S-POS2-3-4 NOT = PREV2-3-4 GO TO PRNT-RTNE.
00534 005330 CLR-TEMP-CTR.
00535 005340 MOVE 0 TO TEMP-REC-CT.
00536 005350 SAV-NEW-R.
00537 005360 MOVE SORT-REC TO SAVED-SORT.
00538 005370 ADD 1 TO TEMP-REC-CT.
00539 005380 GO TO READ-SORTED.
00540 005390 PRNT-RTNE.
00541 005400 IF PREV1 = 0 GO TO MAJ-DETAILS.
00542 005410 IF 1ST-MIN = 1 MOVE 0 TO 1ST-MIN, GO TO MAJ-TOTALS.
00543 005420 IF RDF2 NOT = SAV-MAJ-LTR GO TO MIN-TOTALS.
00544 005430 MIN-DETAILS.
00545 005440 IF RDF4 = 0 GO TO CK-HED-R10.
00546 005450 IF RDF4 = 1 GO TO CK-HED-R11.
00547 005460 IF RDF4 = 2 GO TO CK-HED-R12.
00548 005470 IF RDF4 = 3 GO TO CK-HED-R13.
00549 005480 IF RDF4 = 4 GO TO CK-HED-R14.
00550 005490 IF RDF4 = 5 GO TO CK-HED-R15.
00551 005500 IF RDF4 = 6 GO TO CK-HED-R16.
00552 005510 IF RDF4 = 7 GO TO CK-HED-R17.
00553 005520 IF RDF4 = 8 GO TO CK-HED-R18.
00554 005530 IF RDF4 = 9 GO TO CK-HED-R19.
00555 005540 CLR-P1-2.
00556 005550 MOVE SPACES TO WITHOUT-TOT, WK-PRINT2.
00557 005560 IF SORT-REC = '999999' GO TO MIN-TOTALS.
00558 005570 GO TO CLR-TEMP-CTR.
00559 005580
00560 005590
00561 005600
00562 005610
00563 005620
00564 005630
00565 005640
00566 005650
00567 005660

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FIGURE A.2, cont.

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00569	058040 MAJ-DETAILS.	EGP0106
00570	IF 1ST-REC = 0 GO TO MAJ-15-HEADED.	EGP0106
00571	MOVE 0 TO 1ST-REC.	EGP0106
00572	WRITE PR11 FROM HEAD1 AFTER ADVANCING 0 LINES.	EGP0106
00573	MOVE 1 TO PAGENUM.	EGP0106
00574	WRITE PR11 FROM HEAD2 AFTER ADVANCING 1 LINES.	EGP0106
00575	WRITE PR11 FROM HEAD3 AFTER ADVANCING 2 LINES.	EGP0106
00576	MOVE SPACES TO PR11.	EGP0106
00577	WRITE PR11 AFTER ADVANCING 1 LINES.	EGP0106
00578	058130 MAJ-15-HEADED.	EGP0106
00579	MOVE R0F2 TO LC-X.	EGP0106
00580	WRITE PR11 FROM WK-PRINT1 AFTER ADVANCING 1 LINES.	EGP0106
00581	WRITE PR11 FROM WK-PRINT2 AFTER ADVANCING 1 LINES.	EGP0106
00582	GO TO CLR-PI-2.	VEGP0106
00583	058190 MAJ-TOTALS.	EGP0106
00584	ADD 1 TO TENX.	EGP0106
00585	COMPUTE BIG-TOT = G0 (TENX) + G1 (TENX) + G2 (TENX)	EGP0106
00586	+ G3 (TENX) + G4 (TENX) + G5 (TENX)	EGP0106
00587	+ G6 (TENX) + G7 (TENX) + G8 (TENX)	EGP0106
00588	+ G9 (TENX).	EGP0106
00589	MOVE BIG-TOT TO COL-TOT (TENX).	EGP0106
00590	IF TENX = 10 GO TO MAJ-TOTALS.	EGP0106
00591	MOVE 0 TO TENX.	EGP0106
00592	MOVE OVERALL TO COL-GRND.	EGP0106
00593	WRITE PR11 FROM WK-PRINT3 AFTER ADVANCING 3 LINES.	EGP0106
00594	MOVE SPACES TO PR13-TO-CLR.	EGP0106
00595	MOVE R0F2 TO SAV-MAJ-LTR.	EGP0106
00596	MOVE MINOR TO MAJ-MIN.	VEGP0106
00597	GO TO MIN-DETAILS.	EGP0106
00598	059070 CK-HED-R10.	EGP0106
00599	IF RPT10-SWT = 1 GO TO R10-HEADED.	EGP0106
00600	MOVE 1 TO RPT10-SWT.	EGP0106
00601	MOVE R0F2 TO HD15.	EGP0106
00602	MOVE R0F4 TO HD16.	EGP0106
00603	MOVE 10 TO RPTND.	EGP0106
00604	ADD 1 TO PAGECT1, MOVE PAGECT1 TO PAGENUM.	EGP0106
00605	WRITE PR11 FROM HEAD1 AFTER ADVANCING 0 LINES.	EGP0106
00606	WRITE PR11 FROM HEAD2 AFTER ADVANCING 1 LINES.	EGP0106
00607	WRITE PR11 FROM HEAD3 AFTER ADVANCING 2 LINES.	EGP0106
00608	MOVE SPACES TO PR11.	EGP0106
00609	MOVE PR11 AFTER ADVANCING 1 LINES.	EGP0106
00610	059190 R10-HEADED.	EGP0106
00611	MOVE R0F3 TO LC-X.	EGP0106
00612	WRITE PR11 FROM WK-PRINT1 AFTER ADVANCING 1 LINES.	EGP0106
00613	WRITE PR11 FROM WK-PRINT2 AFTER ADVANCING 1 LINES.	EGP0106
00614	GO TO CLR-PI-2.	EGP0106
00615	061010 CK-HEJ-R11.	EGP0106
00616	IF RPT11-SWT = 1 GO TO R11-HEADED.	EGP0106
00617	MOVE 1 TO RPT11-SWT.	EGP0106
00618	MOVE R0F2 TO HD15.	EGP0106
00619	MOVE R0F4 TO HD16.	EGP0106
00620	MOVE 11 TO RPTND.	EGP0106
00621	ADD 1 TO PAGECT2, MOVE PAGECT2 TO PAGENUM.	EGP0106
00622	WRITE PR12 FROM HEAD1 AFTER ADVANCING 0 LINES.	EGP0106
00623		EGP0106
00624		EGP0106

FIGURE A.2, cont.

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00525	061090	WRITE PRT2 FROM HEAD2 AFTER ADVANCING 1 LINES.	EGPD106
00526	061100	WRITE PRT2 FROM HEAD3 AFTER ADVANCING 2 LINES.	EGPD106
00527	061110	MOVE SPACES TO PRT2.	EGPD106
00528	061120	WRITE PRT2 AFTER ADVANCING 1 LINES.	EGPD106
00529	061130	R11-HEADED.	EGPD106
00530	061140	MOVE RDF3 TO LC-X.	EGPD106
00531	061150	WRITE PRT2 FROM WK-PRINT1 AFTER ADVANCING 1 LINES.	EGPD106
00532	061160	WRITE PRT2 FROM WK-PRINT2 AFTER ADVANCING 1 LINES.	EGPD106
00533	061170	GO TO CLR-PI-2.	EGPD106
00534			
00535	062010	CK-HED-R12.	EGPD106
00536	062020	IF RPT12-SWT = 1 GO TO R12-HEADED.	EGPD106
00537	062030	MOVE 1 TO RPT12-SWT.	EGPD106
00538	062040	MOVE RDF2 TO HD15.	EGPD106
00539	062050	MOVE RDF4 TO HD16.	EGPD106
00540	062060	MOVE 12 TO RPTNO.	EGPD106
00541	062070	ADD 1 TO PAGECT3. MOVE PAGECT3 TO PAGENUM1.	EGPD106
00542	062080	WRITE PRT3 FROM HEAD1 AFTER ADVANCING 0 LINES.	EGPD106
00543	062090	WRITE PRT3 FROM HEAD2 AFTER ADVANCING 1 LINES.	EGPD106
00544	062100	WRITE PRT3 FROM HEAD3 AFTER ADVANCING 2 LINES.	EGPD106
00545	062110	MOVE SPACES TO PRT3.	EGPD106
00546	062120	WRITE PRT3 AFTER ADVANCING 1 LINES.	EGPD106
00547	062130	R12-HEADED.	EGPD106
00548	062140	MOVE RDF3 TO LC-X.	EGPD106
00549	062150	WRITE PRT3 FROM WK-PRINT1 AFTER ADVANCING 1 LINES.	EGPD106
00550	062160	WRITE PRT3 FROM WK-PRINT2 AFTER ADVANCING 1 LINES.	EGPD106
00551	062170	GO TO CLR-PI-2.	EGPD106
00552			
00553	063010	CK-HED-R13.	EGPD106
00554	063020	IF RPT13-SWT = 1 GO TO R13-HEADED.	EGPD106
00555	063030	MOVE 1 TO RPT13-SWT.	EGPD106
00556	063040	MOVE RDF2 TO HD15.	EGPD106
00557	063050	MOVE RDF4 TO HD16.	EGPD106
00558	063060	MOVE 13 TO RPTNO.	EGPD106
00559	063070	ADD 1 TO PAGECT4. MOVE PAGECT4 TO PAGENUM.	EGPD106
00560	063080	WRITE PRT4 FROM HEAD1 AFTER ADVANCING 0 LINES.	EGPD106
00561	063090	WRITE PRT4 FROM HEAD2 AFTER ADVANCING 1 LINES.	EGPD106
00562	063100	WRITE PRT4 FROM HEAD3 AFTER ADVANCING 2 LINES.	EGPD106
00563	063110	MOVE SPACES TO PRT4.	EGPD106
00564	063120	WRITE PRT4 AFTER ADVANCING 1 LINES.	EGPD106
00565	063130	R13-HEADED.	EGPD106
00566	063140	MOVE RDF3 TO LC-X.	EGPD106
00567	063150	WRITE PRT4 FROM WK-PRINT1 AFTER ADVANCING 1 LINES.	EGPD106
00568	063160	WRITE PRT4 FROM WK-PRINT2 AFTER ADVANCING 1 LINES.	EGPD106
00569	063170	GO TO CLR-PI-2.	EGPD106
00570			
00571	064010	CK-HED-R14.	VEGP0106
00572	064020	IF RPT14-SWT = 1 GO TO R14-HEADED.	VEGP0106
00573	064030	MOVE 1 TO RPT14-SWT.	VEGP0106
00574	064040	MOVE RDF2 TO HD15.	VEGP0106
00575	064050	MOVE RDF4 TO HD16.	VEGP0106
00576	064060	MOVE 14 TO RPTNO.	VEGP0106
00577	064070	ADD 1 TO PAGECT5. MOVE PAGECT5 TO PAGENUM.	VEGP0106
00578	064080	WRITE PRT5 FROM HEAD1 AFTER ADVANCING 0 LINES.	VEGP0106
00579	064090	WRITE PRT5 FROM HEAD2 AFTER ADVANCING 1 LINES.	VEGP0106
00580	064100	WRITE PRT5 FROM HEAD3 AFTER ADVANCING 2 LINES.	VEGP0106
00581	064110	MOVE SPACES TO PRT5.	VEGP0106

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FIGURE A.2, cont.

00682	064120	WRITE PRT5 AFTER ADVANCING 1 LINES.	VEGP0106
00683	064130	R14-HEADED.	VEGP0106
00684	064140	MOVE RDF3 TO LC-X.	VEGP0106
00685	064150	WRITE PRT5 FROM WK-PRINT1 AFTER ADVANCING 1 LINES.	VEGP0106
00686	064160	WRITE PRT5 FROM WK-PRINT2 AFTER ADVANCING 1 LINES.	VEGP0106
00687	064170	GO TO CLR-PI-2.	VEGP0106
00688			
00689	065010	CK-HEAD-R15.	VEGP0106
00690	065020	IF RPT15-SWT = 1 GO TO R15-HEADED.	VEGP0106
00691	065030	MOVE 1 TO RPT15-SWT.	VEGP0106
00692	065040	MOVE RDF2 TO HD15.	VEGP0106
00693	065050	MOVE RDF4 TO HD16.	VEGP0106
00694	065060	MOVE 15 TO RPTNO.	VEGP0106
00695	065070	ADD 1 TO PAGECT6 MOVE PAGECT6 TO PAGENUM.	VEGP0106
00696	065080	WRITE PRT6 FROM HEAD1 AFTER ADVANCING 0 LINES.	VEGP0106
00697	065090	WRITE PRT6 FROM HEAD2 AFTER ADVANCING 1 LINES.	VEGP0106
00698	065100	WRITE PRT6 FROM HEAD3 AFTER ADVANCING 2 LINES.	VEGP0106
00699	065110	MOVE SPACES TO PRT6.	VEGP0106
00700	065120	WRITE PRT6 AFTER ADVANCING 1 LINES.	VEGP0106
00701	065130	R15-HEADED.	VEGP0106
00702	065140	MOVE RDF3 TO LC-X.	VEGP0106
00703	065150	WRITE PRT6 FROM WK-PRINT1 AFTER ADVANCING 1 LINES.	VEGP0106
00704	065160	WRITE PRT6 FROM WK-PRINT2 AFTER ADVANCING 1 LINES.	VEGP0106
00705	065170	GO TO CLR-PI-2.	VEGP0106
00706			
00707	066010	CK-HEAD-R16.	VEGP0106
00708	066020	IF RPT16-SWT = 1 GO TO R16-HEADED.	VEGP0106
00709	066030	MOVE 1 TO RPT16-SWT.	VEGP0106
00710	066040	MOVE RDF2 TO HD15.	VEGP0106
00711	066050	MOVE RDF4 TO HD16.	VEGP0106
00712	066060	MOVE 16 TO RPTNO.	VEGP0106
00713	066070	ADD 1 TO PAGECT7 MOVE PAGECT7 TO PAGENUM.	VEGP0106
00714	066080	WRITE PRT7 FROM HEAD1 AFTER ADVANCING 0 LINES.	VEGP0106
00715	066090	WRITE PRT7 FROM HEAD2 AFTER ADVANCING 1 LINES.	VEGP0106
00716	066100	WRITE PRT7 FROM HEAD3 AFTER ADVANCING 2 LINES.	VEGP0106
00717	066110	MOVE SPACES TO PRT7.	VEGP0106
00718	066120	WRITE PRT7 AFTER ADVANCING 1 LINES.	VEGP0106
00719	066130	R16-HEADED.	VEGP0106
00720	066140	MOVE RDF3 TO LC-X.	VEGP0106
00721	066150	WRITE PRT7 FROM WK-PRINT1 AFTER ADVANCING 1 LINES.	VEGP0106
00722	066160	WRITE PRT7 FROM WK-PRINT2 AFTER ADVANCING 1 LINES.	VEGP0106
00723	066170	GO TO CLR-PI-2.	VEGP0106
00724			
00725	067010	CK-HEAD-R17.	VEGP0106
00726	067020	IF RPT17-SWT = 1 GO TO R17-HEADED.	VEGP0106
00727	067030	MOVE 1 TO RPT17-SWT.	VEGP0106
00728	067040	MOVE RDF2 TO HD15.	VEGP0106
00729	067050	MOVE RDF4 TO HD16.	VEGP0106
00730	067060	MOVE 17 TO RPTNO.	VEGP0106
00731	067070	ADD 1 TO PAGECT8 MOVE PAGECT8 TO PAGENUM.	VEGP0106
00732	067080	WRITE PRT8 FROM HEAD1 AFTER ADVANCING 0 LINES.	VEGP0106
00733	067090	WRITE PRT8 FROM HEAD2 AFTER ADVANCING 1 LINES.	VEGP0106
00734	067100	WRITE PRT8 FROM HEAD3 AFTER ADVANCING 2 LINES.	VEGP0106
00735	067110	MOVE SPACES TO PRT8.	VEGP0106
00736	067120	WRITE PRT8 AFTER ADVANCING 1 LINES.	VEGP0106
00737	067130	R17-HEADED.	VEGP0106
00738	067140	MOVE RDF3 TO LC-X.	VEGP0106

FIGURE A.2, cont.

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00733	067150	WRITE PR18 FROM WK-PRINT1 AFTER ADVANCING 1 LINES.	VEGP0106
00740	067160	WRITE PR18 FROM WK-PRINT2 AFTER ADVANCING 1 LINES.	VEGP0106
00741	067170	GO TO CLR-PI-2.	VEGP0106
00742			
00743	068010	CK-HEAD-R19.	VEGP0106
00744	068020	IF RPT18-SWT = 1 GO TO R18-HEADED.	VEGP0106
00745	068030	MOVE 1 TO RPT18-SWT.	VEGP0106
00746	068040	MOVE R0F2 TO HD15.	VEGP0106
00747	068050	MOVE R0F4 TO HD16.	VEGP0106
00748	068060	MOVE 19 TO RPTND.	VEGP0106
00749	068070	ADD 1 TO PAGECT9. MOVE PAGECT9 TO PAGENUM.	VEGP0106
00750	068080	WRITE PR19 FROM HEAD1 AFTER ADVANCING 0 LINES.	VEGP0106
00751	068090	WRITE PR19 FROM HEAD2 AFTER ADVANCING 1 LINES.	VEGP0106
00752	068100	WRITE PR19 FROM HEAD3 AFTER ADVANCING 2 LINES.	VEGP0106
00753	068110	MOVE SPACES TO PR19.	VEGP0106
00754	068120	WRITE PR19 AFTER ADVANCING 1 LINES.	VEGP0106
00755	068130	R19-HEADED.	VEGP0106
00756	068140	MOVE R0F3 TO LC-X.	VEGP0106
00757	068150	WRITE PR19 FROM WK-PRINT1 AFTER ADVANCING 1 LINES.	VEGP0106
00758	068160	WRITE PR19 FROM WK-PRINT2 AFTER ADVANCING 1 LINES.	VEGP0106
00759	068170	GO TO CLR-PI-2.	VEGP0106
00760			
00761	069010	CK-HEAD-R19.	VEGP0106
00762	069020	IF RPT19-SWT = 1 GO TO R19-HEADED.	VEGP0106
00763	069030	MOVE 1 TO RPT19-SWT.	VEGP0106
00764	069040	MOVE R0F2 TO HD15.	VEGP0106
00765	069050	MOVE R0F4 TO HD16.	VEGP0106
00766	069060	MOVE 19 TO RPTND.	VEGP0106
00767	069070	ADD 1 TO PAGECT10. MOVE PAGECT10 TO PAGENUM.	VEGP0106
00768	069080	WRITE PR10 FROM HEAD1 AFTER ADVANCING 0 LINES.	VEGP0106
00769	069090	WRITE PR10 FROM HEAD2 AFTER ADVANCING 1 LINES.	VEGP0106
00770	069100	WRITE PR10 FROM HEAD3 AFTER ADVANCING 2 LINES.	VEGP0106
00771	069110	MOVE SPACES TO PR10.	VEGP0106
00772	069120	WRITE PR10 AFTER ADVANCING 1 LINES.	VEGP0106
00773	069130	R19-HEADED.	VEGP0106
00774	069140	MOVE R0F3 TO LC-X.	VEGP0106
00775	069150	WRITE PR10 FROM WK-PRINT1 AFTER ADVANCING 1 LINES.	VEGP0106
00776	069160	WRITE PR10 FROM WK-PRINT2 AFTER ADVANCING 1 LINES.	VEGP0106
00777	069170	GO TO CLR-PI-2.	VEGP0106
00778	073010	MIN-TOTALS.	VEGP0106
00779	073020	IF RPT10-SWT = 0 GO TO CK-MIN-TOT11.	VEGP0106
00780	073030	MOVE 0 TO RPT10-SWT.	VEGP0106
00781	073040	MOVE 1 TO TBL-SUBS.	VEGP0106
00782	073050	PERFORM GET-TBL-TOTS THRU EXIT-GET-TBL-TOTS.	VEGP0106
00783	073060	WRITE PR11 FROM WK-PRINT3 AFTER ADVANCING 3 LINES.	VEGP0106
00784	073070	MOVE SPACES TO PR13-TO-CLR.	VEGP0106
00785	073080	CK-MIN-TOT11.	VEGP0106
00786	073090	IF RPT11-SWT = 0 GO TO CK-MIN-TOT12.	VEGP0106
00787	073100	MOVE 0 TO RPT11-SWT.	VEGP0106
00788	073110	MOVE 11 TO TBL-SUBS.	VEGP0106
00789	073120	PERFORM GET-TBL-TOTS THRU EXIT-GFT-TBL-TOTS.	VEGP0106
00790	073130	WRITE PR12 FROM WK-PRINT3 AFTER ADVANCING 3 LINES.	VEGP0106
00791	073140	MOVE SPACES TO PR13-TO-CLR.	VEGP0106
00792	073150	CK-MIN-TOT12.	VEGP0106
00793	073160	IF RPT12-SWT = 0 GO TO CK-MIN-TOT13.	VEGP0106
00794	073170	MOVE 0 TO RPT12-SWT.	VEGP0106
00795	073180	MOVE 21 TO TBL-SUBS.	VEGP0106

FIGURE A.2, cont.

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00796	PERFORM GET-TBL-TOTS THRU EXIT-GET-TBL-TOTS.	VEGP0106
00797	WRITE PRT3 FROM WK-PRINT3 AFTER ADVANCING 3 LINES.	VEGP0106
00798	MOVE SPACES TO PRT3-TO-CLR.	VEGP0106
00799	CK-MIN-TOT13.	VEGP0106
00800	IF RPT13-SWT = 0 GO TO CK-MIN-TOT14.	VEGP0106
00801	MOVE 0 TO RPT13-SWT.	VEGP0106
00802	MOVE 31 TO TBL-SUBS.	VEGP0106
00803	PERFORM GET-TBL-TOTS THRU EXIT-GET-TBL-TOTS.	VEGP0106
00804	WRITE PRT4 FROM WK-PRINT3 AFTER ADVANCING 3 LINES.	VEGP0106
00805	MOVE SPACES TO PRT3-TO-CLR.	VEGP0106
00806	CK-MIN-TOT14.	VEGP0106
00807	IF RPT14-SWT = 0 GO TO CK-MIN-TOT15.	VEGP0106
00808	MOVE 0 TO RPT14-SWT.	VEGP0106
00809	MOVE 41 TO TBL-SUBS.	VEGP0106
00810	PERFORM GET-TBL-TOTS THRU EXIT-GET-TBL-TOTS.	VEGP0106
00811	WRITE PRT5 FROM WK-PRINT3 AFTER ADVANCING 3 LINES.	VEGP0106
00812	MOVE SPACES TO PRT3-TO-CLR.	VEGP0106
00813	CK-MIN-TOT15.	VEGP0106
00814	IF RPT15-SWT = 0 GO TO CK-MIN-TOT16.	VEGP0106
00815	MOVE 0 TO RPT15-SWT.	VEGP0106
00816	MOVE 51 TO TBL-SUBS.	VEGP0106
00817	PERFORM GET-TBL-TOTS THRU EXIT-GET-TBL-TOTS.	VEGP0106
00818	WRITE PRT6 FROM WK-PRINT3 AFTER ADVANCING 3 LINES.	VEGP0106
00819	MOVE SPACES TO PRT3-TO-CLR.	VEGP0106
00820	CK-MIN-TOT16.	VEGP0106
00821	IF RPT16-SWT = 0 GO TO CK-MIN-TOT17.	VEGP0106
00822	MOVE 0 TO RPT16-SWT.	VEGP0106
00823	MOVE 61 TO TBL-SUBS.	VEGP0106
00824	PERFORM GET-TBL-TOTS THRU EXIT-GET-TBL-TOTS.	VEGP0106
00825	WRITE PRT7 FROM WK-PRINT3 AFTER ADVANCING 3 LINES.	VEGP0106
00826	MOVE SPACES TO PRT3-TO-CLR.	VEGP0106
00827	CK-MIN-TOT17.	VEGP0106
00828	IF RPT17-SWT = 0 GO TO CK-MIN-TOT18.	VEGP0106
00829	MOVE 0 TO RPT17-SWT.	VEGP0106
00830	MOVE 71 TO TBL-SUBS.	VEGP0106
00831	PERFORM GET-TBL-TOTS THRU EXIT-GET-TBL-TOTS.	VEGP0106
00832	WRITE PRT8 FROM WK-PRINT3 AFTER ADVANCING 3 LINES.	VEGP0106
00833	MOVE SPACES TO PRT3-TO-CLR.	VEGP0106
00834	CK-MIN-TOT18.	VEGP0106
00835	IF RPT18-SWT = 0 GO TO CK-MIN-TOT19.	VEGP0106
00836	MOVE 0 TO RPT18-SWT.	VEGP0106
00837	MOVE 81 TO TBL-SUBS.	VEGP0106
00838	PERFORM GET-TBL-TOTS THRU EXIT-GET-TBL-TOTS.	VEGP0106
00839	WRITE PRT9 FROM WK-PRINT3 AFTER ADVANCING 3 LINES.	VEGP0106
00840	MOVE SPACES TO PRT3-TO-CLR.	VEGP0106
00841	CK-MIN-TOT19.	VEGP0106
00842	IF RPT19-SWT = 0 GO TO SAV-NEW-MAJ.	VEGP0106
00843	MOVE 0 TO RPT19-SWT.	VEGP0106
00844	MOVE 91 TO TBL-SUBS.	VEGP0106
00845	PERFORM GET-TBL-TOTS THRU EXIT-GET-TBL-TOTS.	VEGP0106
00846	WRITE PRT10 FROM WK-PRINT3 AFTER ADVANCING 3 LINES.	VEGP0106
00847	MOVE SPACES TO PRT3-TO-CLR.	VEGP0106
00848	SAV-NEW-MAJ.	VEGP0106
00849	IF SORT-REC = '999999' GO TO WRITE-STATS.	VEGP0106
00850	MOVE RDEF2 TO SAV-MAJ-LTR.	VEGP0106
00851	GO TO MIN-DETAILS.	VEGP0106
00852		VEGP0106

FIGURE A.2, cont.

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00853	073110 GET-TBL-TOTS.	VEGP0106
00854	073120 MOVE 1 TO TENX.	VEGP0106
00855	073130 LOOP-RY-10.	VEGP0106
00856	073140 IF TENX 1C MOVE OVERALL TO CCL-GRNO,	VEGP0106
00857	073150 GO TO EXIT-GET-TBL-TOTS.	VEGP0106
00858	073160 MOVE TBL-CT (TBL-SUBS) TO CCL-TOT (TENX).	VEGP0106
00859	073170 ADD 1 TO TBL-SUBS, ADD 1 TO TENX.	VEGP0106
00860	073180 GO TO LOOP-RY-10.	VEGP0106
00861	073190 EXIT-GET-TBL-TOTS. EXIT.	VEGP0106
00862		
00863	074010 WRITE-STATS.	VEGP0106
00864	074020 MOVE SPACES TO STAT-RPT.	VEGP0106
00865	074030 MOVE BIL0-SOATE TO STAT-DATE.	VEGP0106
00866	074040 MOVE WASHINGTON STATE LIBRARY* TO S-COL30-53.	VEGP0106
00867	074050 MOVE *30006385* TO S-RPTING.	VEGP0106
00868	074060 WRITE PRTO FROM STAT-RPT AFTER ADVANCING 0 LINES.	VEGP0106
00869	074070 MOVE SPACES TO STAT-RPT.	VEGP0106
00870	074080 MOVE *OPERATION CONTROL REPORT* TO S-COL30-53.	VEGP0106
00871	074090 WRITE PRTO FROM STAT-RPT AFTER ADVANCING 1 LINES.	VEGP0106
00872	074100 MOVE *INPUT* TO S-COL10-29.	VEGP0106
00873	074110 MOVE SPACES TO S-COL30-53.	VEGP0106
00874	074120 MOVE INRECS TO CT-COL1.	VEGP0106
00875	074130 WRITE PRTO FROM STAT-RPT AFTER ADVANCING 2 LINES.	VEGP0106
00876	074140 MOVE *ACCEPTED* TO S-COL10-29.	VEGP0106
00877	074150 MOVE SPACES TO S-COL30-53.	VEGP0106
00878	074160 MOVE BK-IN TO CT-COL2.	VEGP0106
00879	074170 WRITE PRTO FROM STAT-RPT AFTER ADVANCING 1 LINES.	VEGP0106
00880	074180 MOVE *MISSING LC* TO S-COL10-29.	VEGP0106
00881	074190 MOVE NG-LC TO CT-COL2.	VEGP0106
00882	074200 WRITE PRTO FROM STAT-RPT AFTER ADVANCING 1 LINES.	VEGP0106
00883	074210 MOVE *MISSING DEWEY* TO S-COL10-29.	VEGP0106
00884	074220 MOVE NG-DWY TO CT-COL2.	VEGP0106
00885	074230 WRITE PRTO FROM STAT-RPT AFTER ADVANCING 1 LINES.	VEGP0106
00886	075010 MOVE *DUPLICATE LC* TO S-COL10-29.	VEGP0106
00887	075020 MOVE SPACES TO S-COL30-53.	VEGP0106
00888	075030 MOVE DUP-LC TO CT-COL3.	VEGP0106
00889	075040 WRITE PRTO FROM STAT-RPT AFTER ADVANCING 1 LINES.	VEGP0106
00890	075050 MOVE *DUPLICATE DEWEY* TO S-COL10-29.	VEGP0106
00891	075060 MOVE DUP-DWY TO CT-COL3.	VEGP0106
00892	075070 WRITE PRTO FROM STAT-RPT AFTER ADVANCING 1 LINES.	VEGP0106
00893	075080 MOVE *END OF REPORT* TO STAT-RPT.	VEGP0106
00894	075090 WRITE PRTO FROM STAT-RPT AFTER ADVANCING 3 LINES.	VEGP0106
00895	CLOSE R0.	
00896	075091 CLOSE R1.	
00897	075092 CLOSE R2.	
00898	075093 CLOSE R3.	
00899	075094 CLOSE R4.	
00900	075095 CLOSE R5.	
00901	075096 CLOSE R6.	
00902	075097 CLOSE R7.	
00903	075098 CLOSE R8.	
00904	075099 CLOSE R9.	
00905	075100 CLOSE R10.	
00906	075101 CLOSE R11.	
00907	075110 EXIT-SECT2. EXIT.	VEGP0106

FIGURE A.2, cont.

INTRNL NAME	LVL	SOURCE NAME	BASE	DISPL	INTRNL NAME	DEFINITION	USAGE	R	O	Q
DNM=3-261	FD	BASE-MSTR	DCB=01		DNM=3-261		QSAM			
DNM=3-282	01	DATA-BASE	BLI=1	000	DNM=3-282	DS 2508C	DISP			
DNM=3-300	FD	CTL-CAPD	DCB=02		DNM=3-300		QSAM			
DNM=3-320	01	CTL-INFO	BLI=2	000	DNM=3-320	DS OCL80	GROUP			
DNM=3-340	02	IDENT-CTL	BLI=2	000	DNM=3-340	DS 6C	DISP			
DNM=3-361	8R	GUDD-CTL			DNM=3-361					
DNM=3-385	02	FILLER	BLI=2	006	DNM=3-385	DS 14C	DISP			
DNM=3-400	02	TAG1	BLI=2	014	DNM=3-400	DS 3C	DISP-NM			
DNM=3-413	02	FILLER	BLI=2	017	DNM=3-413	DS 3C	DISP			
DNM=3-431	02	TAG2	BLI=2	01A	DNM=3-431	DS 3C	DISP-NM			
DNM=3-444	02	FILLER	BLI=2	01D	DNM=3-444	DS 3C	DISP			
DNM=3-462	02	TAG3	BLI=2	020	DNM=3-462	DS 3C	DISP-NM			
DNM=3-475	02	FILLER	BLI=2	023	DNM=3-475	DS 3C	DISP			
DNM=3-493	02	TAG4	BLI=2	026	DNM=3-493	DS 3C	DISP-NM			
DNM=4-000	02	FILLER	BLI=2	029	DNM=4-000	DS 3C	DISP			
DNM=4-018	02	TAG5	BLI=2	02C	DNM=4-018	DS 3C	DISP-NM			
DNM=4-031	02	FILLER	BLI=2	02F	DNM=4-031	DS 33C	DISP			
DNM=4-049	FD	R0	DCB=03		DNM=4-049		QSAM			
DNM=4-066	01	PRTO	BLI=3	000	DNM=4-066	DS 133C	DISP			
DNM=4-079	FD	R1	DCB=04		DNM=4-079		QSAM			
DNM=4-096	01	PRT1	BLI=4	000	DNM=4-096	DS 133C	DISP			
DNM=4-112	FD	R2	DCB=05		DNM=4-112		QSAM			
DNM=4-126	01	PRT2	BLI=5	000	DNM=4-126	DS 133C	DISP			
DNM=4-139	FD	R3	DCB=06		DNM=4-139		QSAM			
DNM=4-153	01	PRT3	BLI=6	000	DNM=4-153	DS 133C	DISP			
DNM=4-166	FD	R4	DCB=07		DNM=4-166		QSAM			
DNM=4-180	01	PRT4	BLI=7	000	DNM=4-180	DS 133C	DISP			
DNM=4-193	FD	R5	DCB=08		DNM=4-193		QSAM			
DNM=4-210	01	PRT5	BLI=8	000	DNM=4-210	DS 133C	DISP			
DNM=4-223	FD	R6	DCB=09		DNM=4-223		QSAM			
DNM=4-237	01	PRT6	BLI=9	000	DNM=4-237	DS 133C	DISP			
DNM=4-250	FD	R7	DCB=10		DNM=4-250		QSAM			
DNM=4-264	01	PRT7	BLI=10	000	DNM=4-264	DS 133C	DISP			
DNM=4-277	FD	R8	DCB=11		DNM=4-277		QSAM			
DNM=4-291	01	PRT8	BLI=11	000	DNM=4-291	DS 133C	DISP			
DNM=4-304	FD	R9	DCB=12		DNM=4-304		QSAM			
DNM=4-321	01	PRT9	BLI=12	000	DNM=4-321	DS 133C	DISP			
DNM=4-334	FD	R10	DCB=13		DNM=4-334		QSAM			
DNM=4-349	01	PRT10	BLI=13	000	DNM=4-349	DS 133C	DISP			
DNM=4-363	FD	R11	DCB=14		DNM=4-363		QSAM			
DNM=4-378	01	PRT11	BLI=14	000	DNM=4-378	DS 133C	DISP			
DNM=4-392	SD	SORT-THESE			DNM=4-392					
DNM=4-414	01	REAL-REC	BLI=1	000	DNM=4-414	DS OCL18	GROUP			
DNM=4-434	02	PRIME6	BLI=1	000	DNM=4-434	DS 6C	DISP			
DNM=4-449	02	FILLER	BLI=1	006	DNM=4-449	DS 12C	DISP			
DNM=4-482	77	FILLER	BLI=15	000	DNM=4-482	DS 21C	DISP			
DNM=5-000	77	DEWEY-SUBS	BLI=15	016	DNM=5-000	DS 1H	COMP			
DNM=5-022	77	SAVE-BASE	BLI=15	018	DNM=5-022	DS 1F	COMP			
DNM=5-040	77	DIREC-BMP	BLI=15	01C	DNM=5-040	DS 1H	COMP			
DNM=5-058	77	VARI-BMP	BLI=15	020	DNM=5-058	DS 1F	COMP			
DNM=5-078	77	PULL-BMP	BLI=15	024	DNM=5-078	DS 1H	COMP			
DNM=5-095	77	REC-LDC	BLI=15	026	DNM=5-095	DS 5C	DISP-NM			
DNM=5-114	77	TBL-SUBS	BLI=15	02C	DNM=5-114	DS 1H	COMP			
DNM=5-131	77	SAV-MAJ-LTR	BLI=15	02E	DNM=5-131	DS 1C	DISP			

FIGURE A.2, cont.

INTRNL NAME	LVL	SOURCE NAME	BASE	DISPL	INTRNL NAME	DEFINITION	USAGE	R	O	Q
DNM=5-151	77	SAV-GRND-TOT	BLI=15	02F	DNM=5-151	DS 6C	DISP-NM			
DNM=5-172	77	IST-REC	BLI=15	035	DNM=5-172	DS 1C	DISP-NM			
DNM=5-186	77	IST-MIN	BLI=15	036	DNM=5-186	DS 1C	DISP-NM			
DNM=5-204	77	RPT10-SWT	BLI=15	037	DNM=5-204	DS 1C	DISP-NM			
DNM=5-222	77	RPT11-SWT	BLI=15	038	DNM=5-222	DS 1C	DISP-NM			
DNM=5-240	77	RPT12-SWT	BLI=15	039	DNM=5-240	DS 1C	DISP-NM			
DNM=5-258	77	RPT13-SWT	BLI=15	03A	DNM=5-258	DS 1C	DISP-NM			
DNM=5-274	77	RPT14-SWT	BLI=15	03B	DNM=5-274	DS 1C	DISP-NM			
DNM=5-294	77	RPT15-SWT	BLI=15	03C	DNM=5-294	DS 1C	DISP-NM			
DNM=5-312	77	RPT16-SWT	BLI=15	03D	DNM=5-312	DS 1C	DISP-NM			
DNM=5-330	77	RPT17-SWT	BLI=15	03E	DNM=5-330	DS 1C	DISP-NM			
DNM=5-351	77	RPT18-SWT	BLI=15	03F	DNM=5-351	DS 1C	DISP-NM			
DNM=5-369	77	RPT19-SWT	BLI=15	C40	DNM=5-369	DS 1C	DISP-NM			
DNM=5-387	77	TIME	BLI=15	041	DNM=5-387	DS 8C	DISP-NM			
DNM=5-400	77	JDATE	BLI=15	049	DNM=5-400	DS 5C	DISP-NM			
DNM=5-414	77	PAGECT11	BLI=15	04E	DNM=5-414	DS 3C	DISP-NM			
DNM=5-430	77	PAGECT12	BLI=15	051	DNM=5-430	DS 3C	DISP-NM			
DNM=5-446	77	PAGECT13	BLI=15	054	DNM=5-446	DS 3C	DISP-NM			
DNM=5-465	77	PAGECT14	BLI=15	057	DNM=5-465	DS 3C	DISP-NM			
DNM=5-481	77	PAGECT15	BLI=15	05A	DNM=5-481	DS 3C	DISP-NM			
DNM=6-000	77	PAGECT16	BLI=15	05D	DNM=6-000	DS 3C	DISP-NM			
DNM=6-016	77	PAGECT17	BLI=15	060	DNM=6-016	DS 3C	DISP-NM			
DNM=6-035	77	PAGECT18	BLI=15	063	DNM=6-035	DS 3C	DISP-NM			
DNM=6-054	77	PAGECT19	BLI=15	066	DNM=6-054	DS 3C	DISP-NM			
DNM=6-073	77	PAGECT10	BLI=15	069	DNM=6-073	DS 3C	DISP-NM			
DNM=6-093	77	FIRST-RETURN	BLI=15	06C	DNM=6-093	DS 1C	DISP-NM			
DNM=6-114	77	TEMP-REC-CT	BLI=15	06D	DNM=6-114	DS 5C	DISP-NM			
DNM=6-134	77	PRT-SURS	BLI=15	072	DNM=6-134	DS 1H	COMP			
DNM=6-151	77	OVERALL	BLI=15	074	DNM=6-151	DS 5C	DISP-NM			
DNM=6-170	77	LINE-TOT-SAV	BLI=15	079	DNM=6-170	DS 6C	DISP-NM			
DNM=6-191	77	PCT-RESULT	BLI=15	07F	DNM=6-191	DS 4C	DISP-NM			
DNM=6-210	77	BIG-TOT	BLI=15	083	DNM=6-210	DS 5C	DISP-NM			
DNM=6-224	77	TENX	BLI=15	088	DNM=6-229	DS 1H	COMP			
DNM=6-242	01	WORK-MAST-A	BLI=15	090	DNM=6-242	DS OCL2508	GROUP			
DNM=6-265	02	LEADER	BLI=15	090	DNM=6-265	DS OCL24	GROUP			
DNM=6-283	03	TOT-LGTH	BLI=15	090	DNM=6-283	DS 5C	DISP-NM			
DNM=6-300	03	FILLER	BLI=15	095	DNM=6-300	DS 7C	DISP			
DNM=6-318	03	BASE-AUR	BLI=15	09C	DNM=6-318	DS 5C	DISP-NM			
DNM=6-335	03	FILLER	BLI=15	0A1	DNM=6-335	DS 7C	DISP			
DNM=6-353	02	DIRECTORY	BLI=15	0A8	DNM=6-353	DS OCL12	GROUP			*
DNM=6-374	03	TAG	BLI=15	0A8	DNM=6-374	DS 3C	DISP-NM			
DNM=6-389	03	LGTH	BLI=15	0A8	DNM=6-389	DS 4C	DISP-NM			
DNM=6-408	03	DISPL	BLI=15	0AF	DNM=6-408	DS 5C	DISP-NM			
DNM=6-425	01	WORK-MAST-B	BLI=15	090	DNM=6-425	DS OCL2508	GROUP			*
DNM=6-448	02	RECI	BLI=15	090	DNM=6-448	DS 1C	DISP			*
DNM=6-461	01	PULLED-VARIES	BLI=15	A50	DNM=6-461	DS OCL540	GROUP			*
DNM=6-485	02	VARI-FLD	BLI=15	A60	DNM=6-486	DS OCL108	GROUP			*
DNM=7-000	03	VARI-TAG	BLI=15	A60	DNM=7-000	DS 3C	DISP-NM			
DNM=7-020	03	VARI-FLOA	BLI=15	A64	DNM=7-020	DS 1F	COMP			
DNM=7-044	03	VARI-FLOD	BLI=15	A68	DNM=7-044	DS OCL100	GROUP			*
DNM=7-068	04	VARI-FLOD	BLI=15	A68	DNM=7-068	DS 1C	DISP			
DNM=7-089	01	CTL-SELECTS	BLI=15	C80	DNM=7-089	DS 15C	DISP			*
DNM=7-112	01	SAVE-SELECTS	BLI=15	C80	DNM=7-112	DS OCL15	GROUP			*
DNM=7-139	02	SELEC-TAG	BLI=15	C80	DNM=7-139	DS 3C	DISP-NM			*
DNM=7-157	01	SORT-REC	BLI=15	C90	DNM=7-157	DS OCL6	GROUP			

FIGURE A.2, cont.

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INTRNL NAME	LVL	SOURCE NAME	BASE	DISPL	INTRNL NAME	DEFINITION	USAGE	R	O	Q
DNM=7-177	D2	S-POS1	BLI=15	C90	DNM=7-177	DS 1C	DISP-NM			
DNM=7-195	02	S-POS2-3-4	BLI=15	C91	DNM=7-195	DS 3C	DISP			
DNM=7-214	02	S-POS5	BLI=15	C94	DNM=7-214	DS 1C	DISP-NM			
DNM=7-232	D2	S-POS6	BLI=15	C95	DNM=7-232	DS 1C	DISP-NM			
DNM=7-250	01	SAVED-SORT	BLI=15	C98	DNM=7-250	DS OCL6	GROUP			
DNM=7-272	02	PREV1	BLI=15	C98	DNM=7-272	DS 1C	DISP-NM			
DNM=7-286	02	PREV2-3-4	BLI=15	C99	DNM=7-286	DS 3C	DISP			
DNM=7-304	02	PREV-MIN	BLI=15	C9C	DNM=7-304	DS 1C	DISP-NM			
DNM=7-321	02	PREV6	BLI=15	C9D	DNM=7-321	DS 1C	DISP-NM			
DNM=7-338	01	REDEF-REDEF-SORT	BLI=15	C98	DNM=7-338	DS OCL6	GROUP	*		
DNM=7-366	02	RDF-1	BLI=15	C98	DNM=7-366	DS 1C	DISP-NM			
DNM=7-380	02	RDF-2-3	BLI=15	C99	DNM=7-380	DS OCL2	GROUP			
DNM=7-399	03	RDF2	BLI=15	C99	DNM=7-399	DS 1C	DISP			
DNM=7-415	03	RDF3	BLI=15	C9A	DNM=7-415	DS 1C	DISP			
DNM=7-428	02	RDF-4-5	BLI=15	C9B	DNM=7-428	DS OCL2	GROUP			
DNM=7-447	03	RDF4	BLI=15	C9B	DNM=7-447	DS 1C	DISP-NM			
DNM=7-460	03	RDF5	BLI=15	C9C	DNM=7-460	DS 1C	DISP-NM			
DNM=7-473	02	RDF-RDF45	BLI=15	C9B	DNM=7-473	DS 2C	DISP-NM	*		
DNM=7-491	02	RDF-6	BLI=15	C9D	DNM=7-491	DS 1C	DISP-NM			
DNM=8-000	01	BLD-OUTREC	BLI=15	CAD	DNM=8-000	DS OCL6	GROUP			
DNM=8-023	02	POS1	BLI=15	CAD	DNM=8-023	DS 1C	DISP-NM			
DNM=8-036	02	POS2-3	BLI=15	CAL	DNM=8-036	DS OCL2	GROUP			
DNM=8-057	03	POS2	BLI=15	CAL	DNM=8-057	DS 1C	DISP			
DNM=8-073	03	POS3	BLI=15	CA2	DNM=8-073	DS 1C	DISP			
DNM=8-086	02	POS4-5	BLI=15	CA3	DNM=8-086	DS OCL2	GROUP			
DNM=8-104	03	POS4	BLI=15	CA3	DNM=8-104	DS 1C	DISP			
DNM=8-117	03	POS5	BLI=15	CA4	DNM=8-117	DS 1C	DISP			
DNM=8-130	02	POS6	BLI=15	CA5	DNM=8-130	DS 1C	DISP-NM			
DNM=8-143	01	LC-HOLD	BLI=15	CA8	DNM=8-143	DS OCL2	GROUP			
DNM=8-165	02	MAJ-LTR	BLI=15	CA8	DNM=8-165	DS 1C	DISP			
DNM=8-181	02	MIN-LTR	BLI=15	CA9	DNM=8-181	DS 1C	DISP			
DNM=8-197	01	DEWEY-HOLD	BLI=15	CB0	DNM=8-197	DS OCL2	GROUP			
DNM=8-219	02	MAJ-NUM	BLI=15	CB0	DNM=8-219	DS 1C	DISP-NM			
DNM=8-235	02	MIN-NUM	BLI=15	CB1	DNM=8-235	DS 1C	DISP-NM			
DNM=8-251	01	REDEF-DEWEY-HOLD	BLI=15	CB0	DNM=8-251	DS OCL2	GROUP	*		
DNM=8-279	02	MAJ-AN	BLI=15	CB0	DNM=8-279	DS 1C	DISP			
DNM=8-294	02	MIN-AN	BLI=15	CB1	DNM=8-294	DS 1C	DISP			
DNM=8-309	01	DEWEY-NUMBER	BLI=15	CB0	DNM=8-309	DS 2C	DISP-NM	*		
DNM=8-330	01	TBL-NUM-CTS	BLI=15	CB8	DNM=8-330	DS S00C	DISP			
DNM=8-350	01	R-TBL-NUM-CTS	BLI=15	CB8	DNM=8-350	DS OCL500	GROUP	*		
DNM=8-375	D2	TBL-CT	BLI=15	CB8	DNM=8-375	DS 5C	DISP-NM	*		
DNM=8-390	01	TABLE-GROUPS	BLI=15	CB8	DNM=8-390	DS OCL500	GROUP	*		
DNM=8-414	02	GRP-OF-10	BLI=15	CB8	DNM=8-414	DS OCL50	GROUP	*		
DNM=8-435	03	G0	BLI=15	CB8	DNM=8-435	DS 5C	DISP-NM			
DNM=8-449	03	G1	BLI=15	CB8	DNM=8-449	DS 5C	DISP-NM			
DNM=8-463	03	G2	BLI=15	CB2	DNM=8-463	DS 5C	DISP-NM			
DNM=8-477	03	G3	BLI=15	CC7	DNM=8-477	DS 5C	DISP-NM			
DNM=8-491	03	G4	BLI=15	CCC	DNM=8-491	DS 5C	DISP-NM			
DNM=9-000	03	G5	BLI=15	CCD	DNM=9-000	DS 5C	DISP-NM			
DNM=9-017	03	G6	BLI=15	CD6	DNM=9-017	DS 5C	DISP-NM			
DNM=9-034	03	G7	BLI=15	CD8	DNM=9-034	DS 5C	DISP-NM			
DNM=9-048	03	G8	BLI=15	CED	DNM=9-048	DS 5C	DISP-NM			
DNM=9-065	03	G9	BLI=15	CE5	DNM=9-065	DS 5C	DISP-NM			
DNM=9-082	01	STAT-CTS	BLI=15	EB0	DNM=9-082	DS OCL36	GROUP			
DNM=9-105	02	INRECS	BLI=15	EBD	DNM=9-105	DS 6C	DISP-NM			

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FIGURE A.2, cont.

INTRNL NAME	LVL	SOURCE NAME	BASE	DISPL	INTRNL NAME	DEFINITION	USAGE	R	D	Q
DNM=9-120	02	OK-IN	BLI=15	EB6	DNM=9-120	DS 6C	DISP-NM			
DNM=9-134	02	NG-LC	BLI=15	EB8	DNM=9-134	DS 6C	DISP-NM			
DNM=9-151	02	NG-DWY	BLI=15	EC2	DNM=9-151	DS 6C	DISP-NM			
DNM=9-166	02	DUP-LC	BLI=15	EC8	DNM=9-166	DS 6C	DISP-NM			
DNM=9-181	02	DUP-DWY	BLI=15	ECF	DNM=9-181	DS 6C	DISP-NM			
DNM=9-200	01	HEAD1	BLI=15	ED8	DNM=9-200	DS OCL134	GROUP			
DNM=9-217	02	MAJ-MIN	BLI=15	ED8	DNM=9-217	DS 8C	DISP			
DNM=9-233	02	FILLER	BLI=15	ED0	DNM=9-233	DS 8C	DISP			
DNM=9-251	02	HD15	BLI=15	EE8	DNM=9-251	DS 1C	DISP			
DNM=9-264	02	HD16	BLI=15	EE9	DNM=9-264	DS 1C	DISP			
DNM=9-277	02	FILLER	BLI=15	EEA	DNM=9-277	DS 38C	DISP			
DNM=9-295	02	FILLER	BLI=15	F10	DNM=9-295	DS 70C	DISP			
DNM=9-313	02	FILLER	BLI=15	F56	DNM=9-313	DS 1C	DISP			
DNM=9-331	02	RPTND	BLI=15	F57	DNM=9-331	DS 2C	DISP-NM			
DNM=9-345	02	FILLER	BLI=15	F59	DNM=9-345	DS 5C	DISP			
DNM=9-363	01	HEAD2	BLI=15	F60	DNM=9-363	DS OCL133	GROUP			
DNM=9-383	02	FILLER	BLI=15	F60	DNM=9-383	DS 2C	DISP			
DNM=9-401	02	RPTND	BLI=15	F62	DNM=9-401	DS 2C	RPT			
DNM=9-425	02	FILLER	BLI=15	F64	DNM=9-425	DS 1C	DISP			
DNM=9-443	02	RPTDY	BLI=15	F65	DNM=9-443	DS 2C	RPT			
DNM=9-464	02	FILLER	BLI=15	F67	DNM=9-464	DS 1C	DISP			
DNM=9-482	02	RPTVR	BLI=15	F68	DNM=9-482	DS 2C	DISP-NM			
DNM=10-000	02	FILLER	BLI=15	F6A	DNM=10-000	DS 23C	DISP			
DNM=10-016	02	FILLER	BLI=15	F81	DNM=10-016	DS 92C	DISP			
DNM=10-036	02	FILLER	BLI=15	FDD	DNM=10-036	DS 5C	DISP			
DNM=10-054	02	PAGENUM	BLI=15	FE2	DNM=10-054	DS 3C	RPT			
DNM=10-077	01	HEAD3	BLI=15	FE8	DNM=10-077	DS OCL133	GROUP			
DNM=10-097	02	FILLER	BLI=15	FE8	DNM=10-097	DS 96C	DISP			
DNM=10-115	02	FILLER	BLI=16	048	DNM=10-115	DS 37C	DISP			
DNM=10-133	01	WK-PRTI-PARTIAL	BLI=16	070	DNM=10-133	DS OCL133	GROUP			
DNM=10-163	02	WITHOUT-TOT	BLI=16	070	DNM=10-163	DS 127C	DISP			
DNM=10-183	02	FILLER	BLI=16	0EF	DNM=10-183	DS 6C	DISP			
DNM=10-201	01	WK-PRINT1	BLI=16	070	DNM=10-201	DS OCL133	GROUP			
DNM=10-225	02	FILLER	BLI=16	070	DNM=10-225	DS 4C	DISP			
DNM=10-243	02	LC-X	BLI=16	074	DNM=10-243	DS 3C	DISP			
DNM=10-259	02	DTL-COL-1	BLI=16	077	DNM=10-259	DS OCL12	GROUP			*
DNM=10-283	03	TGT-PART	BLI=16	077	DNM=10-283	DS 5C	RPT			
DNM=10-308	03	PCT-PART-1	BLI=16	07C	DNM=10-308	DS 5C	RPT			
DNM=10-342	03	PCT-CHAR-1	BLI=16	081	DNM=10-342	DS 2C	DISP			
DNM=10-367	02	LINE-TOT	BLI=16	0EF	DNM=10-367	DS 6C	RPT			
DNM=10-389	01	WK-PRINT2	BLI=16	0F8	DNM=10-389	DS OCL133	GROUP			
DNM=10-413	02	FILLER	BLI=16	0F8	DNM=10-413	DS 12C	DISP			
DNM=10-431	02	DTL-COL-2	BLI=16	104	DNM=10-431	DS OCL12	GROUP			*
DNM=10-455	03	PCT-PART-2	BLI=16	104	DNM=10-455	DS 5C	RPT			
DNM=10-486	03	PCT-CHAR-2	BLI=16	109	DNM=10-486	DS 7C	DISP			
DNM=11-000	02	FILLER	BLI=16	17C	DNM=11-000	DS 1C	DISP			
DNM=11-018	01	WK-PRINT3	BLI=16	180	DNM=11-018	DS OCL133	GROUP			
DNM=11-042	02	FILLER	BLI=16	180	DNM=11-042	DS 7C	DISP			
DNM=11-060	03	PRT3-TO-CLR	BLI=16	187	DNM=11-060	DS OCL126	GROUP			*
DNM=11-083	03	COL-TOTS	BLI=16	187	DNM=11-083	DS OCL12	GROUP			
DNM=11-103	04	COL-TDT	BLI=16	187	DNM=11-103	DS 5C	RPT			
DNM=11-127	04	FILLER	BLI=16	18C	DNM=11-127	DS 7C	DISP			
DNM=11-148	03	COL-GRND	BLI=16	1FF	DNM=11-148	DS 6C	RPT			
DNM=11-173	01	STAT-RPT	BLI=16	208	DNM=11-173	DS OCL82	GROUP			
DNM=11-193	02	FILLER	BLI=16	208	DNM=11-193	DS 2C	DISP			

FIGURE A.2, cont.

INTRNL NAME	LVL	SOURCE NAME	BASE	DISPL	INTRNL NAME	DEFINITION	USAGE	R	O	Q
DNM=11-211	02	STAT-DATE	BLI=16	20A	DNM=11-211	DS 8C	DISP			
DNM=11-232	02	S-COL10-29	BLI=16	212	DNM=11-232	DS 20C	DISP			
DNM=11-254	02	S-COL30-53	BLI=16	226	DNM=11-254	DS OCL24	GROUP			
DNM=11-279	03	CT-COL1	BLI=16	226	DNM=11-279	DS 6C	RPT			
DNM=11-303	03	FILLER	BLI=16	22C	DNM=11-303	DS 1C	DISP			
DNM=11-321	03	CT-COL2	BLI=16	22D	DNM=11-321	DS 6C	RPT			
DNM=11-345	03	FILLER	BLI=16	233	DNM=11-345	DS 2C	DISP			
DNM=11-363	03	CT COL3	BLI=16	235	DNM=11-363	DS 6C	RPT			
DNM=11-387	03	FILLER	BLI=16	238	DNM=11-387	DS 3C	DISP			
DNM=11-405	02	FILLER	BLI=16	23E	DNM=11-405	DS 20C	DISP			
DNM=11-423	02	S-RPTNO	BLI=16	252	DNM=11-423	DS 8C	DISP			
DNM=11-442	01	BILD-SOATE	BLI=16	260	DNM=11-442	DS OCL8	GROUP			
DNM=11-467	02	STAT-MO	BLI=16	260	DNM=11-467	DS 2C	RPT			
DNM=11-490	02	FILLER	BLI=16	262	DNM=11-490	DS 1C	DISP			
DNM=12-000	02	STAT-DY	BLI=16	263	DNM=12-000	DS 2C	RPT			
DNM=12-023	02	FILLER	BLI=16	265	DNM=12-023	DS 1C	DISP			
DNM=12-041	02	STAT-YR	BLI=16	266	DNM=12-041	DS 2C	DISP-NM			
DNM=12-057	01	STDATE	BLI=16	268	DNM=12-057	DS 6C	DISP-NM			
DNM=12-072	01	REDEF-STDATE	BLI=16	268	DNM=12-072	DS OCL6	GROUP			
DNM=12-099	02	ST-YR	BLI=16	268	DNM=12-099	DS 2C	DISP-NM			
DNM=12-113	02	ST-MO	BLI=16	26A	DNM=12-113	DS 2C	DISP-NM			
DNM=12-127	02	ST-DY	BLI=16	26C	DNM=12-127	DS 2C	DISP-NM			

*

A.3 Book Holdings by Subjects

Tables A.4, A.5, and A.6 provide a general picture of relative subject strength. Titles rather than volumes are shown because of the wide variation in volume to title ratios exhibited in the libraries included in the study. For example, for the collections of King County, University of Washington and the Washington State Library, the estimated volume to title ratios are approximately 8.3 to 1, 2.4 to 1, and 1.4 to 1, respectively. While variations of this order are warranted on the basis of differing clientele and service patterns, a rendering of holdings by volumes can produce a distortion of relative subject strength.

Table A.7 shows the subject analysis of the title holdings of the ten largest libraries. In this table all L.C. classified collections have been translated into Dewey classes to facilitate comparison. This was accomplished using the techniques and tables presented in section A.2.2.

TABLE A.4
ADULT ONLY (INCLUDING ALL DEWEY HOLDINGS OF STATE LIBRARY AND ACADEMIC LIBRARIES)
BOOK HOLDINGS CLASSIFIED IN DEWEY (CIRCA JANUARY 1970)

LIBRARY	000's		100's		200's		300's		400's		500's		600's	
	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.
State Library	5,560	3.81	6,130	4.20	4,860	3.33	36,560	25.03	1,780	1.22	9,610	6.58	30,290	20.74
Seattle	7,784	2.18	10,298	2.89	11,141	3.13	59,135	16.60	4,221	1.18	27,439 ⁽¹⁾	7.70	52,148	14.64
Spokane Public	3,327	2.63	2,201	1.74	3,078	2.43	14,103	11.15	1,165	.92	5,249	4.15	14,093	11.14
Tacoma	2,340	1.95	2,823	2.35	3,403	2.83	17,052	14.25	1,375	1.14	6,263	5.23	13,968	11.67
King County	1,257	1.55	2,060	2.54	1,857	2.29	8,133	10.01	619	.76	4,477	5.51	7,107	8.75
Everett	1,030	1.27	1,716	2.11	2,621	3.23	8,642	10.65	593	.73	2,860	3.52	8,247	10.16
Yakima Valley	509	.68	1,450	1.93	2,016	2.69	7,757	10.35	739	.99	3,082	4.11	7,142	9.53
Bellingham	635	.88	1,362	1.88	1,949	2.70	6,502	8.99	484	.67	3,447	4.77	7,701	10.65
Fort Vancouver Regional	860	1.46	1,331	2.26	1,699	2.89	7,298	12.41	594	1.01	2,641	4.49	6,264	10.65
Richland	711	1.36	1,122	2.15	1,477	2.83	6,863	13.17	374	.72	2,712	5.20	5,124	9.83
Longview	545	1.07	946	1.86	1,808	3.55	5,848	11.48	354	.70	2,414	4.74	4,929	9.68
Pierce County	247	.52	922	1.95	1,207	2.55	5,140	10.88	399	.84	2,147	4.54	5,064	10.72
Kitsap County	256	.57	1,025	2.27	1,175	2.60	4,325	9.57	325	.72	1,965	4.35	5,535	12.25
Sno-Isle Regional	425	.96	673	1.52	620	1.40	2,761	6.24	248	.56	1,451	3.28	4,089	9.25
Whatcom County	302	.69	594	1.36	885	2.03	3,091	7.09	202	.46	1,814	4.16	4,390	10.07
Mid-Columbia Regional	597	1.41	766	1.81	866	2.05	4,975	11.76	507	1.20	2,020	4.78	4,826	11.41
Puyallup	146	.64	546	2.40	501	2.21	2,038	8.98	155	.68	1,074	4.73	2,339	10.30
University of Washington	13,303	2.31	20,175	3.50	13,208	2.29	117,418	20.36	12,028	2.09	61,772	10.71	90,673	15.72
Washington State Univ.	2,961	1.65	5,049	2.82	6,189	3.46	37,947	21.19	3,511	1.96	15,387	8.59	26,908	15.02
East. Wash. State Coll.	1,574	2.08	3,544	4.70	1,610	2.14	19,741	25.72	1,178	1.54	5,866	7.44	6,770	8.49
West. Wash. State Coll.	649	1.40	3,327	7.17	1,246	2.69	14,842	31.99	340	.73	4,398	9.48	3,986	8.59
Everett Community Coll.	296	1.28	1,003	4.32	382	1.65	3,992	17.20	363	1.56	2,875	12.39	3,132	13.50
Yakima Valley Comm. Coll.	245	1.20	980	4.81	421	2.07	4,135	20.29	216	1.06	2,018	9.90	2,038	10.00
Green River Comm. Coll.	385	2.17	925	5.21	424	2.39	3,996	22.52	144	.81	2,022	11.39	1,531	8.63
Centralia Comm. Coll.	207	1.39	780	5.24	302	2.03	2,636	17.71	179	1.20	2,102	14.12	1,445	9.71

(1) Includes Aeronautics, usually classed in 600's
(2) Includes considerable fiction
(3) Fiction included
(4) Biography included

TABLE A.4, cont.
ADULT ONLY (INCLUDING ALL DEWEY HOLDINGS OF STATE LIBRARY AND ACADEMIC LIBRARIES
BOOK HOLDINGS CLASSIFIED IN DEWEY (CIRCA JANUARY 1970))

LIBRARY	700's		800's		900's		BIOGRAPHY (B, 920's)		FICTION		TOTAL NO. OF TITLES
	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	
State Library	15,810	10.82	11,920	8.16	11,240	7.69	7,830	5.36	4,480	3.07	146,070
Seattle	50,584	14.20	27,984	7.85	45,732	12.84	26,703	7.49	33,131	9.30	356,300
Spokane Public	13,735	10.86	10,717	8.47	20,856	16.49	7,968	6.30	29,990	23.71	126,482
Tacoma	16,792	14.15	11,509	9.61	18,211	15.20	7,437	6.21	18,449	15.41	119,621
King County	9,109	11.21	6,682	8.23	10,598	13.05	6,672	8.21	22,657	27.89	81,228
Everett	8,299	10.23	6,812	8.39	12,262	15.11	5,699	7.02	22,370	27.57	81,151
Yakima Valley	7,008	9.35	7,757	10.35	9,908	13.22	4,819	6.43	22,771	30.38	74,957
Bellingham	6,099	8.44	7,666	10.60	10,582	14.64	6,260	8.66	19,614	27.13	72,301
Fort Vancouver Regional	5,947	10.11	5,118	8.70	8,875	15.09	3,787	6.44	14,412	24.50	58,826
Richland	5,133	9.85	3,590	6.89	7,237	13.89	3,375	6.43	14,399	27.63	52,117
Longview	3,848	7.56	4,513	8.47	7,383	14.50	4,979	9.78	13,554	26.62	50,921
Pierce County	5,444	11.52	3,553	7.52	6,792	14.38	2,917	6.17	13,414	28.39	47,247
Kitsap County	4,870	10.78	3,327	7.36	6,649	14.71	3,508	7.76	12,228	27.06	45,188
Sno-Isle Regional	3,912	8.85	2,407	5.44	5,876	13.29	2,513	5.68	19,240	43.51	44,215
Whatcom County	3,315	7.60	2,016	4.62	5,880	13.49	3,125	7.17	17,976	41.24	43,590
Mid-Columbia Regional	4,885	11.55	2,338	5.53	6,458	15.27	2,577	6.09	11,880	28.09	42,297
Puyallup	1,838	8.10	3,576 ⁽²⁾	15.75	2,912	12.83	1,811	7.98	5,769	25.41	22,705
University of Washington	40,099	6.95	112,479 ⁽³⁾	19.50	70,806	12.08	24,765	4.49	--	--	576,735
Washington State Univ.	11,234	6.27	40,833 ⁽³⁾	22.80	26,158	14.60	2,944	1.64	--	--	179,120
East. Wash. State Coll.	6,079	8.07	11,465 ⁽³⁾	15.22	12,690	16.85	5,755	7.64	--	--	75,272
West. Wash. State Coll.	3,687	7.95	7,303 ⁽³⁾	15.74	6,623 ⁽⁴⁾	14.26	--	--	--	--	46,401
Everett Community Coll.	2,063	8.89	3,428	14.77	3,428	14.77	974	4.20	1,270	5.47	23,206
Yakima Valley Comm. Coll.	1,274	6.25	5,302 ⁽³⁾	26.61	2,645	12.98	1,107	5.43	--	--	23,382
Green River Comm. Coll.	1,233	6.95	3,236 ⁽³⁾	18.23	3,852 ⁽⁴⁾	21.70	--	--	--	--	17,748
Centralia Comm. Coll.	1,413	9.45	1,992	13.38	2,816 ⁽⁴⁾	18.94	--	--	997	6.70	14,872

TABLE A.5.
BOOK HOLDINGS CLASSIFIED IN DEBY (CIRCA JANUARY 1970)
JUVENILE ONLY

LIBRARY	000's		100's		200's		300's		400's		500's		600's		700's		800's		900's		BIOGRAPHY		FICTION		TOTAL NO. OF TITLES
	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	TITLES	PCT.	
Seattle	209	.67	192	.63	384	1.22	2,127	6.78	188	.60	2,497	8.60	1,919	6.12	2,675	8.53	768	2.45	3,838	12.23	1,919	6.12	1,455	46.05	31,377
Spokane Public	986	1.75	647	1.19	496	1.64	4,094	7.51	339	.62	1,514	2.78	4,004	7.51	3,984	7.30	3,108	5.70	6,056	11.10	2,331	4.27	26,523	48.63	54,541
Tacoma	290	.97	48	.15	177	1.69	1,853	5.65	184	.44	1,786	7.69	1,865	6.22	2,006	6.69	854	2.85	3,158	10.54	1,664	5.55	15,581	52.01	29,965
King County	83	.36	21	.09	208	.91	1,812	7.08	114	.50	1,434	7.57	763	3.98	1,256	6.56	353	1.84	1,302	6.80	1,023	5.34	11,597	66.53	19,159
Yakima Valley	58	.22	29	.11	259	.97	1,584	5.95	86	.32	2,169	8.22	1,517	5.70	1,884	3.88	874	3.84	2,382	10.46	1,310	5.75	12,667	55.62	22,776
Bellevue	96	.58	11	.07	192	1.17	1,321	8.02	213	1.29	1,375	8.35	883	5.37	1,459	5.48	758	2.85	2,074	7.79	1,354	5.08	15,264	57.31	26,631
Fort Vancouver Regional	102	.50	31	.15	184	.89	1,464	7.11	174	.84	1,638	7.95	1,003	5.23	954	4.82	420	1.14	1,524	8.25	1,055	4.41	8,165	51.32	16,468
Richland	19	.09	75	.26	318	1.51	1,487	7.08	75	.36	1,879	8.95	1,045	5.48	954	3.98	414	2.26	2,085	9.93	1,178	5.61	11,370	54.14	21,001
Longview	61	.48	20	.16	141	1.11	1,477	7.56	81	.64	1,222	9.63	1,045	5.48	1,159	6.08	399	2.09	2,727	14.29	1,159	6.08	9,719	50.94	19,078
Pierce County	48	.25	19	.10	152	.80	1,477	7.56	152	.80	1,222	9.63	951	4.91	1,507	3.63	269	1.93	1,023	7.32	730	5.22	8,756	62.67	13,972
Kitsap County	13	.05	13	.06	104	.70	1,477	7.56	134	.70	1,397	5.50	1,487	4.92	1,310	4.33	460	1.52	2,053	6.79	1,788	5.91	18,992	62.67	30,232
Whatcom County	25	.45	53	.18	212	.70	1,540	5.24	156	.53	1,982	6.56	661	7.18	538	5.84	269	2.92	974	10.58	538	5.84	4,043	43.92	9,206
Mid-Columbia Regional	22	.24	11	.12	112	1.22	1,566	9.13	78	.85	1,064	11.56	1,353	5.35	965	3.82	448	1.77	2,428	9.60	1,572	6.22	14,437	57.08	25,293
Puyallup	40	.16	50	.20	269	1.06	1,502	5.94	119	.47	2,109	8.34	1,256	8.50	992	6.72	1,920	13.00	1,565	11.60	974	6.59	5,678	38.45	14,769
	52	.56	291	1.97	264	1.79	1,092	7.39	82	.36	573	3.88													

TABLE A.6
BOOK HOLDINGS CLASSIFIED IN L.C. (CIRCA JANUARY 1970)

LIBRARY	A	B	C	D	E	F	G	H	I	J	K	L
	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES
	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.
University of Washington	300	7,612	888	13,123	1,158	3,992	3,412	16,275	4,425	825	2,925	2.96
Washington State Univ.	2,462	5,444	944	7,614	5,203	4,982	3,976	11,463	3,327	332	3,771	3.63
East. Wash. State Coll.	23	429	66	644	1,079	2,336	388	1,056	189	64	599	4.95
Cent. Wash. State Coll.	1,063	7,196	585	8,948	4,116	3,364	2,948	14,541	3,629	744	9,585	8.71
West. Wash. State Coll.	405	4,608	603	6,822	3,069	1,772	2,673	7,983	2,448	229	3,591	4.88
Seattle Comm. Coll.	38	925	304	2,285	2,034	1,123	712	2,205	911	238	554	2.52

LIBRARY	M	N	P	Q	R	S	T	U	V	Z	TOTAL NO.
	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES	TITLES	OF TITLES
	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.	PCT.	
University of Washington	5,537	5,988	30,999	19,462	3,932	2,375	6,713	500	38	4,700	132,409
Washington State Univ.	2,991	3,348	19,387	13,916	3,932	3,031	4,568	507	49	2,880	103,932
East. Wash. State Coll.	215	227	2,062	1,757	231	96	271	31	25	243	12,096
Cent. Wash. State Coll.	3,868	4,479	22,479	11,798	2,373	718	3,497	231	21	3,789	110,001
West. Wash. State Coll.	1,197	2,592	19,422	7,551	1,224	513	1,953	423	57	4,437	72,615
Seattle Comm. Coll.	316	1,162	4,663	2,469	370	252	1,189	132	60	158	22,120

(1) Q includes Medicine, usually classed in R.

TABLE A.7

BOOK HOLDINGS OF THE LARGEST LIBRARIES
ADULT ONLY -- LC CLASSIFIED TITLES HAVE BEEN TRANSLATED TO DDC

Library	000's	100's	200's	300's	400's	500's	600's	700's	800's	900's	Biog (B.920)	Fiction	Total titles
University of Washington	18,875	23,016	18,384	146,187	14,178	80,228	103,036	55,292	137,730 ¹	82,842 ²	28,973 ²	--	703,741
Seattle Public Library	7,784	10,298	11,141	59,135	4,221	27,439 ³	52,148	50,584	27,984	45,732	26,703	33,131	350,300
Wash. State University	7,345	7,235	10,012	62,904	4,929	29,165	39,085	21,050	56,739 ¹	39,580 ²	4,455 ²	--	243,099
Washington State Library	5,560	6,130	4,860	36,560	1,780	9,610	30,290	15,810	11,920	11,240	7,830	4,480 ⁴	146,070
Spokane Public Library	3,327	2,201	3,078	14,103	1,165	5,249	14,093	13,735	10,717	20,856	7,968	29,990	126,482
Western Washington St. Coll.	5,237	5,042	4,416	32,501	1,707	11,885	9,718	9,927	23,113 ¹	16,472 ⁵	--	--	129,018
Tacoma Public Library	2,340	2,823	3,403	17,052	1,375	6,263	13,988	16,792	11,509	18,211	7,437	18,449	110,622
Central Washington St. Coll.	4,628	2,728	4,941	31,966	1,664	11,454	9,540	11,102	18,395 ¹	13,545 ⁵	--	--	109,763
Eastern Washington St. Coll.	1,892	3,726	1,936	22,650	1,328	7,489	7,665	6,859	13,152 ¹	14,850	6,735	--	84,282
King County Regional Lib.	1,257	2,060	1,857	8,133	619	4,477	7,107	9,109	6,682	10,598	6,672	22,657	81,228

1. Includes Fiction.

2. Biography vs. 900's reflects DDC proportions.

3. Includes Aeronautics, usually classed in 600's.

4. Purchase of Fiction is a rarity.

5. Biography included.

A.4 Age of Book Collections

Table A.8 shows the age of two book collections, Seattle Public Library and Washington State Library, by subject classification group.

In both cases extensive samples were drawn from the shelf lists of the libraries and then were analyzed with regard to both subject and age.

AGE OF BOOK COLLECTION -- SEATTLE PUBLIC LIBRARY & WASHINGTON STATE LIBRARY

JANUARY 1970

TABLE A.8

SUBJECT LIBRARY	000's			100's			200's		
	WASH. STATE LIBRARY SEATTLE PUBLIC LIBRARY			WASH. STATE LIBRARY SEATTLE PUBLIC LIBRARY			WASH. STATE LIBRARY SEATTLE PUBLIC LIBRARY		
	%	CUM. %	%	%	CUM. %	%	%	CUM. %	%
% OF TOT. COLL.	3.81	2.18	4.20	2.89	3.33	3.13			
MEDIAN AGE	1961	1954	1960	1954	1960	1950			
90% YEAR	1934	1910	1927	1918	1930	1911			
YEAR	%	CUM. %	%	%	CUM. %	%	%	CUM. %	%
1969	3.50	3.57	2.36	2.86	20.00	3.24	2.63	2.63	2.63
1968	10.20	13.70	2.69	5.05	22.86	3.24	0.00	0.00	0.00
1967	11.08	24.78	5.72	10.77	28.57	2.88	5.26	5.26	5.26
1966	7.58	32.36	7.41	18.18	31.43	3.96	13.32	13.32	13.32
1965	4.08	36.44	5.72	23.90	34.29	4.32	17.64	17.64	17.64
1964	2.62	39.06	5.05	28.95	34.29	7.55	25.19	25.19	25.19
1963	4.37	43.43	6.40	35.35	37.15	9.35	34.54	34.54	34.54
1962	4.37	47.80	6.40	41.75	37.15	5.40	39.94	39.94	39.94
1961	4.37	52.17	7.41	49.16	37.15	5.76	45.70	45.70	45.70
1960	3.21	55.38	3.03	52.19	40.01	7.55	53.25	53.25	53.25
1959	2.92	58.30	3.70	55.89	42.87	5.40	58.65	58.65	58.65
1958	1.17	59.47	1.68	57.57	42.87	3.60	62.25	62.25	62.25
1957	2.62	62.09	3.03	60.60	42.87	3.24	65.49	65.49	65.49
1956	2.04	64.13	3.37	63.97	42.87	4.32	69.81	69.81	69.81
1955	2.92	67.05	3.37	67.34	42.87	1.44	71.25	71.25	71.25
1954	1.46	68.51	3.37	70.71	42.87	1.08	72.33	72.33	72.33
1953	1.75	70.26	3.37	72.73	42.87	2.88	75.21	75.21	75.21
1952	1.75	72.01	3.37	76.10	42.87	1.08	76.29	76.29	76.29
1951	1.17	73.18	1.01	77.11	42.87	1.08	77.37	77.37	77.37
1950	2.33	75.51	2.02	79.13	42.87	2.52	79.89	79.89	79.89
Before 1950	24.49	100.00	20.87	100.00	42.84	20.11	100.00	100.00	100.00

AGE OF BOOK COLLECTION -- SEATTLE PUBLIC LIBRARY & WASHINGTON STATE LIBRARY

(continued)

TABLE A.8, cont.

SUBJECT LIBRARY	300's			400's			500's		
	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	SEATTLE PUBLIC LIBRARY
% OF TOT. COLL.	25.03	16.60	1.22	1.18	6.58	7.70			
MEDIAN AGE	1964	1956	1958	1958	1963	1951			
90% YEAR	1949	1914	1918	1913	1945	1913			
YEAR	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%
1969	7.55		6.29		2.13		7.77		2.33
1968	10.79	18.34	6.92	13.21	3.90	6.03	15.19	22.96	4.65
1967	14.75	33.09	5.66	18.87	8.51	14.54	10.25	33.21	2.33
1966	6.83	39.92	8.81	27.68	6.52	21.06	4.59	37.80	1.16
1965	6.83	46.75	3.14	30.82	2.48	23.54	3.89	41.69	1.16
1964	3.96	50.71	1.89	32.71	6.52	30.06	6.36	48.05	1.16
1963	5.76	56.47	2.52	35.23	6.52	36.58	3.18	51.23	4.65
1962	5.03	61.50	3.14	38.37	4.26	40.84	2.12	53.35	0.00
1961	3.24	64.74	1.89	40.26	4.26	45.10	2.83	56.18	1.16
1960	5.76	70.50	1.26	41.52	3.55	48.65	6.01	62.19	8.14
1959	2.52	73.02	3.14	44.66	4.26	52.91	4.59	66.78	2.33
1958	2.88	75.90	3.77	48.43	2.84	55.75	2.83	69.61	3.49
1957	2.16	78.06	0.63	49.06	1.42	57.17	3.18	72.79	2.33
1956	2.52	80.58	2.52	51.58	3.19	60.36	1.41	74.20	2.33
1955	2.52	83.10	0.63	52.21	3.55	63.91	2.47	76.67	3.49
1954	.72	83.82	1.26	53.47	1.06	64.97	1.41	78.08	1.16
1953	1.08	84.90	0.63	54.10	1.42	66.39	2.47	80.55	2.33
1952	1.80	86.70	0.00	54.10	1.42	67.81	.71	81.26	5.81
1951	1.08	87.78	0.63	54.73	1.42	69.23	1.41	82.67	0.00
1950	1.08	88.86	1.26	55.99	1.42	70.65	1.06	83.73	2.33
Before 1950	11.14	100.00	44.01	100.00	29.35	100.00	16.27	100.00	47.66
									100.00

AGE OF BOOK COLLECTION -- SEATTLE PUBLIC LIBRARY & WASHINGTON STATE LIBRARY

(continued)

TABLE A.8, cont.

SUBJECT LIBRARY	600's			700's			800's			900's		
	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	%	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	%	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	%	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	%
% OF TOT. COLL.	20.74	14.64		10.82	14.20		8.16	7.85		7.69	12.84	
MEDIAN AGE	1963	1951		1962	1954		1960	1947		1962	1951	
90% YEAR	1946	1917		1938	1925		1919	1901		1924	1900	
YEAR	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %
1969	7.72	17.90	5.11	7.14	2.90	4.84	2.56	9.93	2.82	14.18	11.97	2.82
1968	10.18	28.43	5.84	15.36	6.52	14.53	4.27	19.37	9.15	10.64	17.60	9.15
1967	10.53	33.34	2.19	11.43	4.35	12.46	3.42	31.83	5.63	10.64	34.75	5.63
1966	4.91	33.34	0.00	3.21	4.35	3.46	2.56	25.29	4.23	3.55	38.30	4.23
1965	5.26	38.60	2.92	3.21	7.97	2.77	6.84	38.06	4.93	3.19	41.49	4.93
1964	3.86	42.46	3.65	2.50	4.35	2.77	6.84	40.83	2.11	3.19	44.68	2.11
1963	4.91	47.37	0.73	3.93	2.17	2.08	5.98	32.47	3.52	1.77	46.45	3.52
1962	6.32	53.69	0.00	2.86	2.90	1.38	1.71	33.88	2.11	4.96	51.41	2.11
1961	5.61	59.30	4.38	4.64	1.45	3.81	2.56	36.44	2.11	2.48	53.89	2.11
1960	4.91	64.21	2.19	3.93	2.90	3.11	1.71	38.15	1.41	3.90	57.79	1.41
1959	2.81	67.02	2.19	1.79	0.72	3.46	0.85	39.03	0.70	2.13	59.92	0.70
1958	1.40	68.42	8.76	2.50	1.45	3.46	0.00	39.00	1.41	2.84	62.76	1.41
1957	1.75	70.17	2.92	2.86	0.72	3.11	0.85	39.85	0.00	7.1	63.47	0.00
1956	2.81	72.98	3.65	2.86	1.45	1.04	1.71	41.56	2.11	1.65	64.53	2.11
1955	1.75	74.73	0.73	1.43	0.72	1.73	0.00	41.56	1.41	3.19	67.72	1.41
1954	5.61	80.34	2.92	3.21	1.45	1.73	0.00	41.56	0.70	1.77	69.49	0.70
1953	1.05	81.39	1.46	2.14	3.62	0.35	1.71	43.27	0.70	2.13	71.62	0.70
1952	3.16	84.55	0.00	2.57	2.17	0.35	0.85	44.12	3.52	0.00	71.62	3.52
1951	1.75	86.30	2.19	1.71	2.17	0.69	0.85	44.97	1.41	7.1	72.33	1.41
1950	1.35	86.65	1.46	1.07	0.72	0.35	0.85	46.12	1.41	7.1	73.04	1.41
Before 1950	3.35	100.00	46.71	19.65	44.95	32.52	53.88	100.00	48.61	26.96	100.00	48.61

AGE OF BOOK COLLECTION -- SEATTLE PUBLIC LIBRARY & WASHINGTON STATE LIBRARY

(continued)

TABLE A.8, cont.

SUBJECT LIBRARY	BIOGRAPHY (920-9)			FICTION			TOTAL		
	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	TOTAL
% OF TOT. COLL.	5.36	7.49	3.07	9.30	100.00	100.00	100.00	100.00	
MEDIAN AGE	1960	1943	1940	1951	1960	1951	1960	1951	
90% YEAR	1923	1893	1901	1911	1931	1905	1931	1905	
YEAR	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%
1969	9.32	20.43	2.47	6.17	1.08	3.24	7.34	13.76	3.98
1968	11.11	28.32	3.70	7.40	2.16	6.12	6.42	24.77	6.48
1967	7.89	34.05	1.23	8.63	2.88	6.84	11.01	30.27	4.63
1966	5.73	37.63	2.47	11.10	.72	7.92	5.50	33.94	3.52
1965	3.58	40.86	2.47	13.57	1.08	8.64	3.67	33.94	5.09
1964	3.23	45.16	3.70	17.27	.72	8.64	0.00	33.94	2.87
1963	4.30	49.82	1.23	18.50	0.00	8.64	3.67	37.61	26.57
1962	2.15	47.31	1.23	24.67	0.36	9.00	0.92	38.53	3.05
1961	2.51	53.05	6.17	27.14	2.52	11.52	2.75	41.28	1.67
1960	3.23	55.20	2.47	29.61	1.44	12.96	0.92	42.20	2.68
1959	2.15	57.35	2.47	32.08	2.88	15.84	0.00	42.20	33.97
1958	2.15	59.86	2.47	33.31	0.36	16.20	1.83	44.03	2.22
1957	2.51	61.65	1.23	38.25	0.36	16.56	0.92	44.95	1.57
1956	1.79	63.44	4.94	39.48	0.72	17.28	0.92	45.87	3.15
1955	1.79	65.23	1.23	40.71	0.72	18.00	1.83	47.70	1.02
1954	.36	67.38	0.00	41.94	1.08	19.08	0.00	48.62	44.54
1953	1.43	68.10	1.23	41.94	1.80	20.88	0.92	49.53	1.02
1952	2.15	68.46	0.00	41.94	2.13	22.04	0.00	50.45	1.67
1951	.72	68.46	0.00	41.94	1.80	24.84	1.83	51.37	1.30
1950	.36	68.46	0.00	41.94	.72	25.56	0.92	51.37	1.39
Before 1950	31.54	100.00	58.06	100.00	74.44	100.00	48.63	100.00	50.92
									52.12
									100.00

A.5 Overlap of Book Holdings

In order to determine to what degree library book collections were duplicative of each other, a sample was constructed of recently published titles and checked against holdings of several key libraries.

Additional small samples were taken and cross searched in libraries to determine the reliability of checking current titles in order to determine total collection overlap. Results confirmed use of the current titles as a satisfactory indicator within the bounds of accuracy and reliability as stated below.

The methodology used in the overlap study was as follows: Titles listed in the 1968 monthly issues of the American Book Publishing Record (30,387) minus paperback titles selling at \$1.00 or less (2,530) were chosen as the appropriate universe. Reliability requirements were that estimated overlap (θ_e) fall within 5% of the actual overlap (θ_a) with a confidence level of 95%.

$$P\{|\theta_e - \theta_a| \leq 0.05\} > 0.95 \quad (1)$$

where P = Probability
 $\theta_e - \theta_a$ = Maximum error

Using the normal approximation to the binomial distribution (1) becomes

$$P\{|Z| \leq \frac{0.05}{\sqrt{\theta_a(1-\theta_a)/n}}\} \geq 0.95 \quad (2)$$

where Z = Root of the normal distribution

for $P = .95$, $|Z| = 1.96$ and (2) becomes

$$1.96 \leq \frac{0.05}{\sqrt{\theta_a(1-\theta_a)/n}}; \quad n \geq \theta_a(1-\theta_a) \left\{ \frac{1.96}{0.05} \right\}^2$$

Assuming the worst case (requiring the largest n)

$$\theta_a = .5 \quad (.25)(1536.64) = 384$$

then

$$(.25)(1536.64) = 384$$

To obtain increased accuracy and to simplify computation, a sample size of 500 titles (95% reliability with accuracy $\pm 2.167\%$) was selected.

Titles were chosen randomly from the 1968 issues of BPR, clipped and taped to key sort cards. Each citation was marked by a cataloger to indicate the best first search word(s) and the titles were checked against the catalogs of the libraries. When a title was located, the preassigned numbered hole was notched allowing for needle sorting of the cards.

Table A.2 summarizes the results of the overlap study. 438 of the 500 sample titles were located in the 33 libraries. It is estimated, therefore, that 87.6% of the 1968 American book imprints, or 24,403 titles, were purchased by this set of libraries, and were available circa January 1970. Allowing for some retrospective purchasing since and additions, however minor, provided by the libraries not searched, a reasonable estimate is that 90% of currently published American titles are purchased by the libraries in the state.

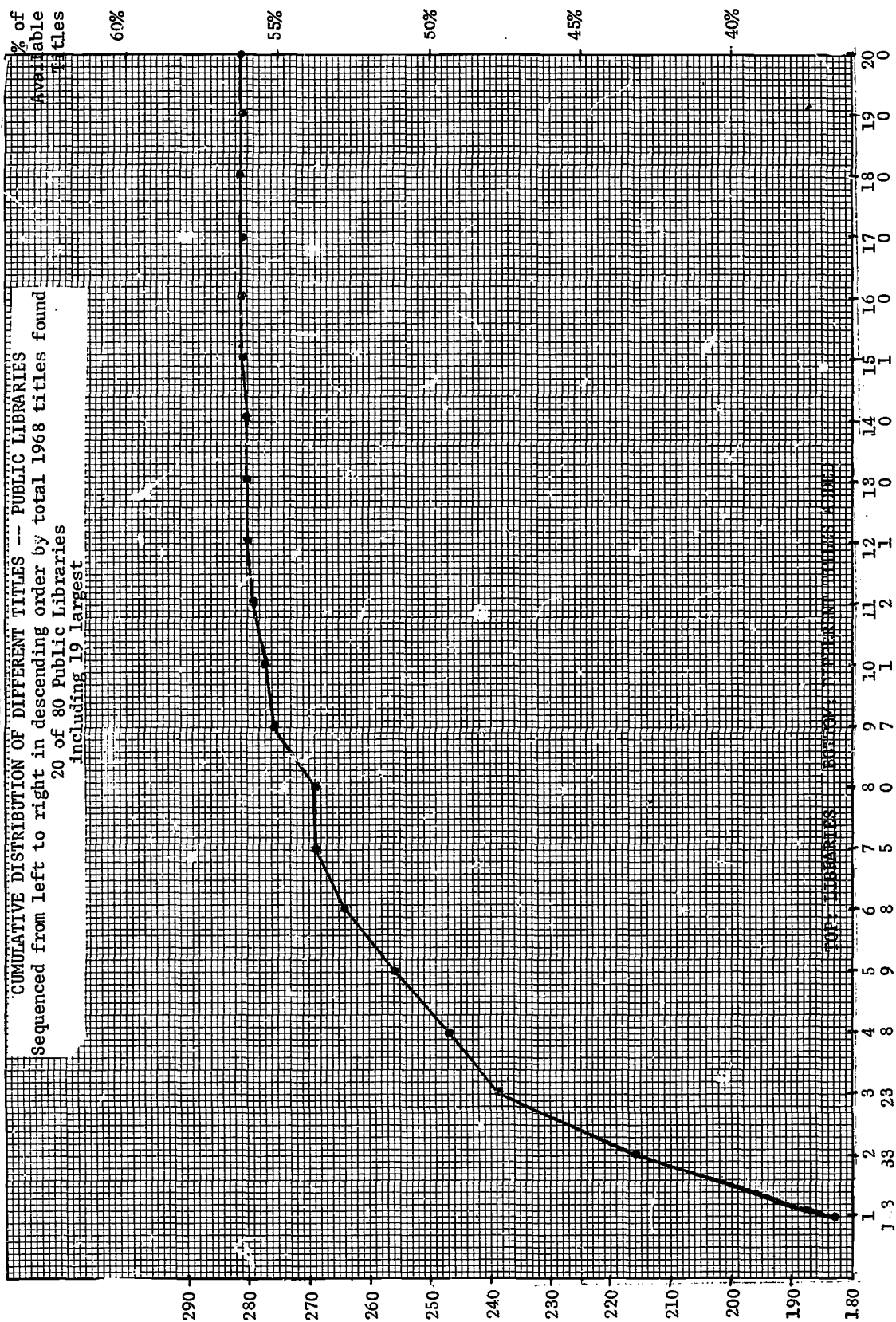
That no one library purchased more than 42% of the available titles is striking evidence of the potential cooperation through networking. Indeed, even the universities and colleges taken as a group would gain access to 38% more titles by borrowing from public and community college libraries.¹

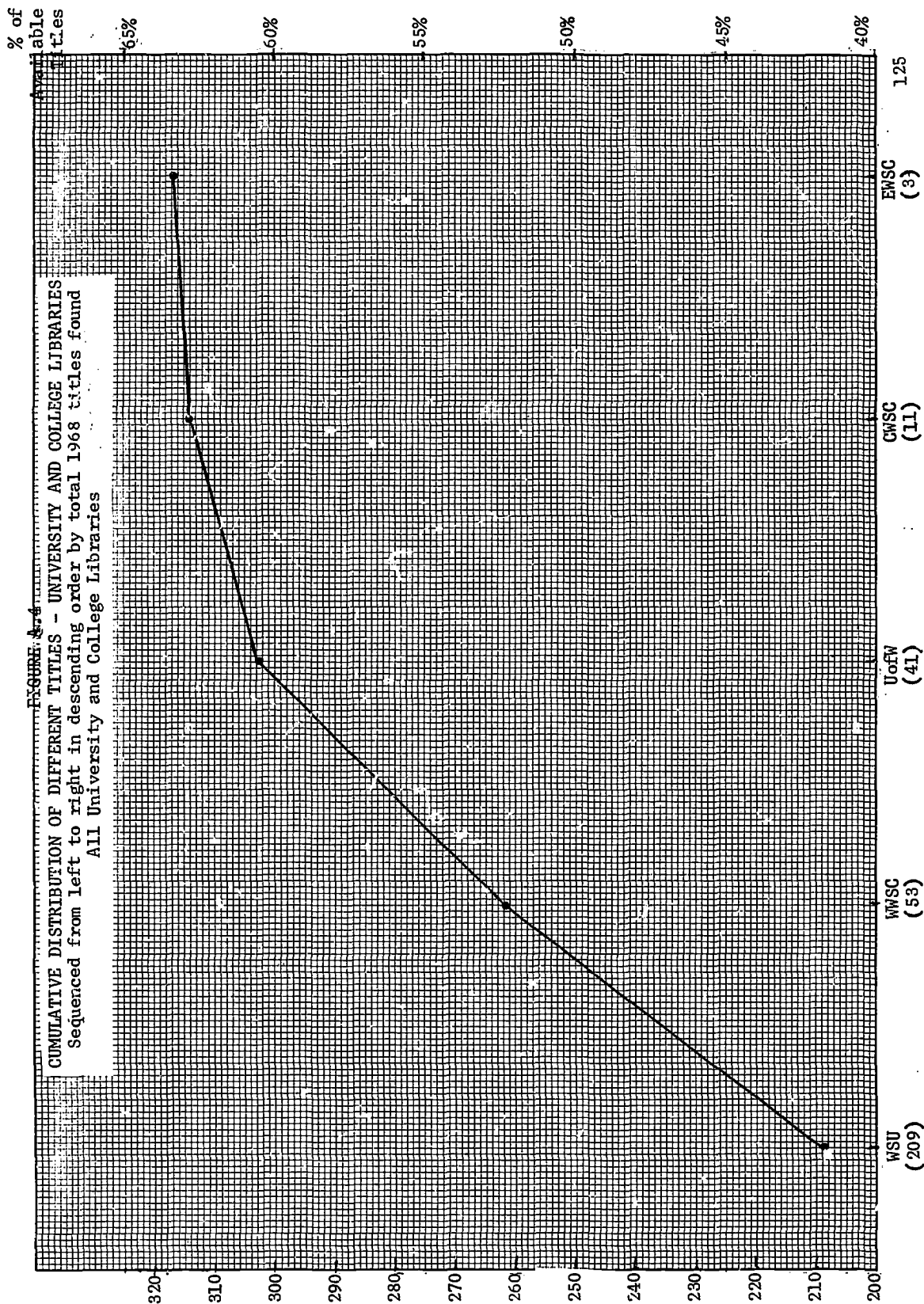
Figures A.3 through A.6 show cumulative distributions of different titles found for each of the three groups (types) of libraries in the sample and for all libraries in the sample.

TABLE A.9
CUMULATION OF DIFFERENT TITLES FOUND
1968 SAMPLE

NO.	LIBRARY	TITLES FOUND	DIFFERENT TITLES ADDED	CUMULATED TITLES ADDED	CUMULATED PERCENTAGE
1	Washington State University	209	209	209	47.72
2	Western Washington State College	198	53	262	59.82
3	University of Washington	191	41	303	69.18
4	Seattle Public	183	66	369	84.25
5	Central Washington State College	172	9	378	86.30
6	Washington State Library	139	16	394	89.95
7	Tacoma Public	120	14	408	93.15
8	King County	112	8	416	94.98
9	Pierce County	107	4	420	95.89
10	Spokane Public	107	4	424	96.80
11	Spokane County	90	5	429	97.95
12	Longview Public	87	0	429	97.95
13	Sno-Isle Regional	87	0	429	97.95
14	Yakima Valley Regional	86	2	431	98.40
15	Timberland Regional	79	1	432	98.63
16	Bellingham Public	68	0	432	98.63
17	Everett Public	67	1	433	98.86
18	Richland Public	64	0	433	98.86
19	Fort Vancouver Regional	62	0	433	98.86
20	Kitsap County Regional	62	0	433	98.86
21	Seattle Community College	62	0	433	98.86
22	Mid-Columbia Regional	59	2	435	99.32
23	Tacoma Community College	55	1	436	99.54
24	Shoreline Community College	54	0	436	99.54
25	Walla Walla Public	52	2	438	100.00
26	Eastern Washington State College	45	0	438	100.00
27	North Central Regional	42	0	438	100.00
28	Puyallup Public	23	0	438	100.00
29	Whatcom County Regional	17	0	438	100.00
30	Yakima Valley Regional	17	0	438	100.00
31	Everett Community College	16	0	438	100.00
32	Green River Community College	11	0	438	100.00
33	Centralia Community College	7	0	438	100.00
TOTALS		2,750	438	438	100.00

FIGURE A.3





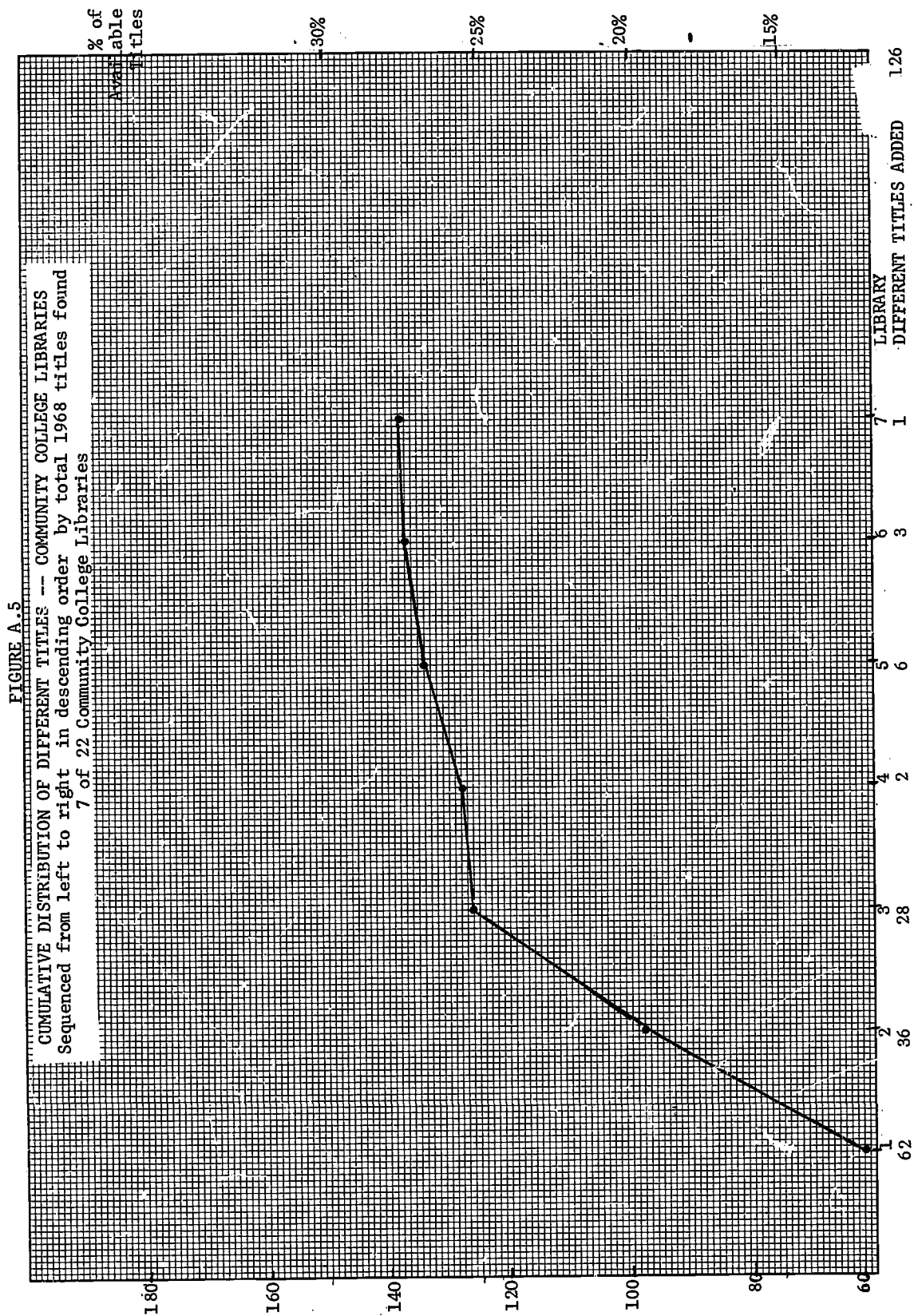


FIGURE A.6

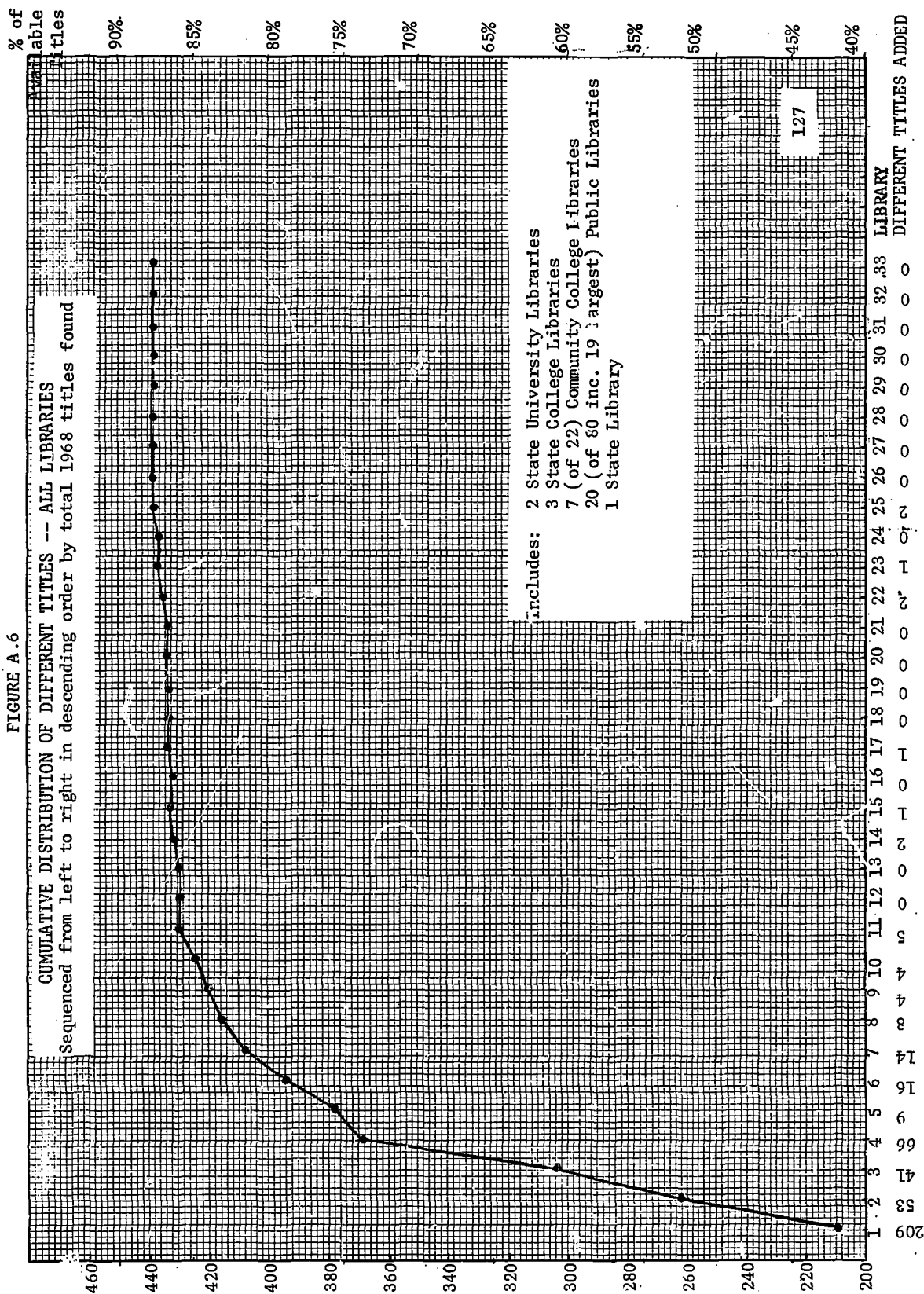


Table A.10 and Fig. A.7 show how the located titles were distributed among which numbers of libraries. The median figure of 4.02 allows us to state that in general if a title is available in any one library, we can expect it to be also available in three additional libraries.

The Title Overlap Matrix (Table A.11) records for all paired combinations the number of titles found in one library which were also found in the second library. Thus, of the 209 titles found in the Washington State University Library, 145 of those titles were also found in the Western Washington State College (Wilson) Library.

TABLE A.10
TITLE DUPLICATION BY LIBRARIES

Examples: 58 titles were located in only 1 library.
23 titles were located in only 7 libraries.
No titles were in all 33 libraries.

No. of Libraries									
Holding Titles Below	1	2	3	4	5	6	7	8	9
Titles Held by Above									
No. of Libraries	58	54	76	30	41	24	23	17	23

No. of Libraries									
Holding Titles Below	10	11	12	13	14	15	16	17	18
Titles Held by Above									
No. of Libraries	16	13	7	5	8	6	7	3	9

No. of Libraries									
Holding Titles Below	19	20	21	22	23	24	25	26	27
Titles Held by Above									
No. of Libraries	4	3	2	3	1	1	1	0	1

No. of Libraries						
Holding Titles Below	28	29	30	31	32	33
Titles Held by Above						
No. of Libraries	0	1	0	1	0	0

Mode = 3 libraries.
Median = 4.0244 libraries.
Mean = 6.2763 libraries.

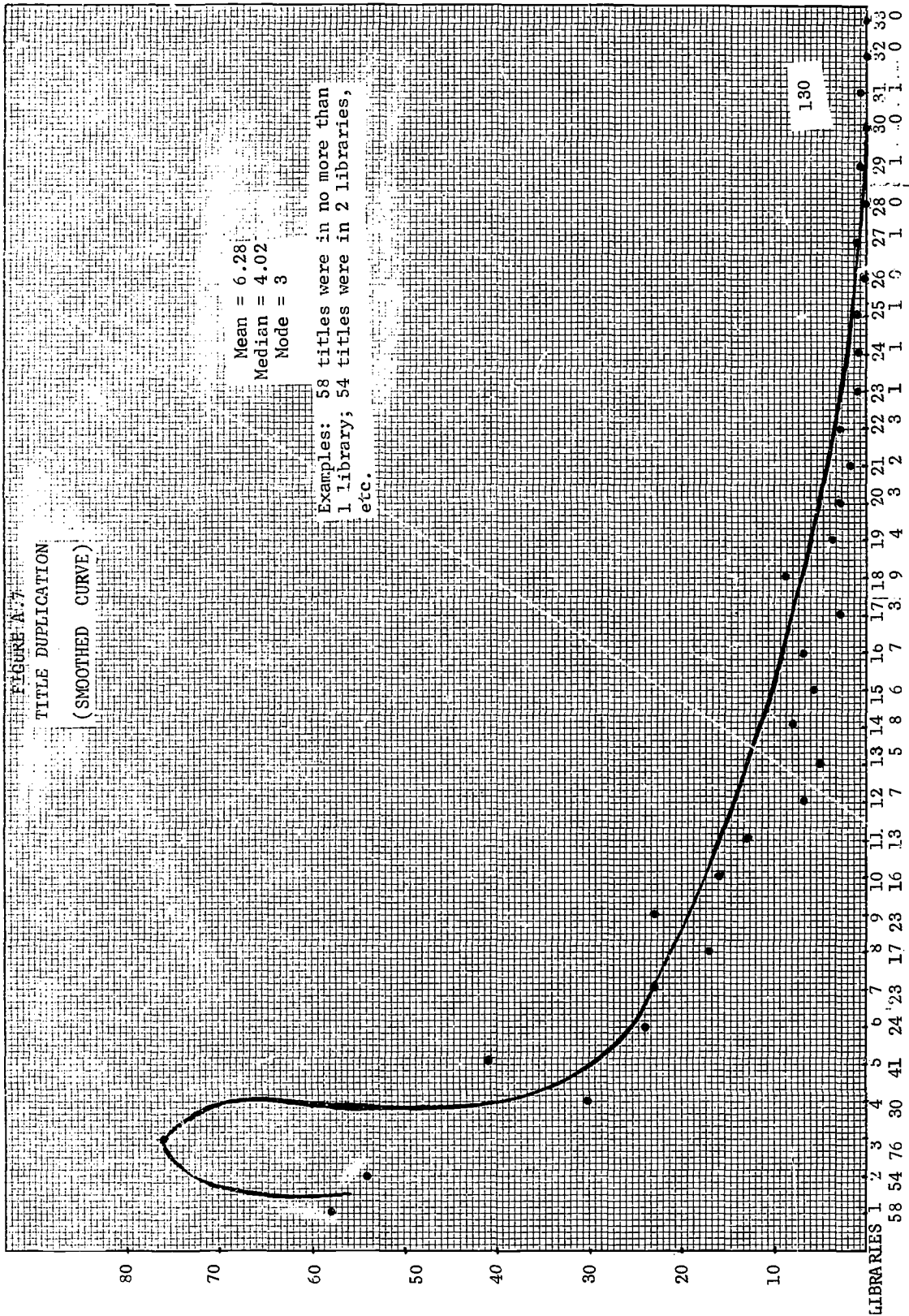


TABLE A-11
TITLE OVERLAP MATRIX

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TITLE OVERLAP MATRIX		
NO. YOUNG	NO. UNIQUE	LIBRARY
209	11	WASH. STATE UNIVERSITY
198	6	WEST. WASH. STATE COLL.
191	10	UNIV. OF WASHINGTON
183	6	SEATTLE PUBLIC LIBRARY
172	6	CENT. WASH. STATE COLL.
139	8	WASHINGTON STATE LIB.
130	0	TACOMA PUBLIC LIBRARY
112	2	KING COUNTY LIBRARY
107	1	PIERCE COUNTY LIBRARY
107	1	SPOKANE PUBLIC LIBRARY
60	2	SPOKANE COUNTY LIBRARY
87	0	LONGVIEW PUBLIC LIBRARY
57	0	SNO-ISLE REGIONAL LIB.
86	6	YAKIMA VALLEY REG. LIB.
79	0	TIMBERLAND REG. LIB.
68	0	BELLINGHAM PUB. LIB.
67	1	EVERETT PUBLIC LIBRARY
64	0	RICHLAND PUBLIC LIB.
62	0	FORT VANCOUVER REG. LIB.
62	0	KITSAP COUNTY REG. LIB.
62	0	SEATTLE COMMUNITY COLL.
59	0	MID-COLUMBIA REG. LIB.
55	1	TACOMA COMMUNITY COLL.
54	2	SHORELINE COMM. COLL.
52	0	WALLA WALLA PUB. LIB.
45	0	EAST. WASH. STATE COLL.
42	0	NORTH CENTRAL REG. LIB.
23	0	POVALLUP PUBLIC LIB.
17	0	WHATCOM COUNTY REG. LIB.
17	0	YAKIMA VALLEY COLLEGE
16	0	EVERETT COMM. COLLEGE
11	0	GREEN RIVER COMM. COLL.
7	0	CENTRALIA COMM. COLLEGE
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Table A.12 is derivative of the foregoing and shows the probability of title duplication between any pair. Thus, of all of the titles held by Washington State University, we can expect to find 69% of them (probability of .69) also at the Western Washington State College (Wilson) Library. The number of unique titles is also recorded on both matrices. Note that of the 209 titles found at WSU, only 11 were unique, i.e., not duplicated elsewhere. Both matrices are concerned only with the presence or absence of titles in a library and not with the number of duplicate copies in any library.²

TABLE A.12
TITLE DUPLICATION PROBABILITY MATRIX

133

TABLE A.12			LIBRARY																																			
FILE DUPLICATION PROBABILITY MATRIX			LIBRARY																																			
133			LIBRARY																																			
NO. FOUND	NO. UNIQUE	LIBRARY	LIBRARY																																			
			WASH. STATE UNIVERSITY	WEST. WASH. STATE COLL.	UNIV. OF WASHINGTON	SEATTLE PUBLIC LIBRARY	CENT. WASH. STATE COLL.	WASHINGTON STATE LIB.	TACOMA PUBLIC LIBRARY	KING COUNTY LIBRARY	PIERCE COUNTY LIBRARY	SPOKANE PUBLIC LIBRARY	SPOKANE COUNTY LIBRARY	LONGVIEW PUBLIC LIBRARY	SNO-ISLE REGIONAL LIB.	YAKIMA VALLEY REG. LIB.	TIMBERLAND REG. LIBRARY	BELLINGHAM PUBLIC LIB.	EVERETT PUBLIC LIB.	RICHLAND PUBLIC LIB.	FORT VANCOUVER REG. LIB.	KITSAP COUNTY REG. LIB.	SEATTLE COMMUNITY COLL.	MID-COLUMBIA REG. LIB.	TACOMA COMMUNITY COLL.	SHORELINE COMM. COLL.	WALLA WALLA PUB. LIB.	EAST. WASH. STATE COLL.	NORTH CENTRAL REG. LIB.	PULLMAN PUBLIC LIB.	WHATCOM COUNTY REG. LIB.	YAKIMA VALLEY COLLEGE	EVERETT COMM. COLLEGE	GREEN RIVER COMM. COLL.	CENTRALIA COMM. COLLEGE			
209	11	WASH. STATE UNIVERSITY	1.0	.69	.59	.37	.57	.35	.25	.22	.22	.22	.20	.15	.09	.14	.18	.15	.15	.12	.13	.11	.11	.17	.11	.15	.17	.10	.13	.11	.04	.02	.05	.06	.03	.01		
198	6	WEST. WASH. STATE COLL.	.73	1.0	.60	.40	.67	.38	.26	.22	.24	.24	.18	.16	.20	.16	.16	.15	.15	.12	.13	.12	.13	.17	.10	.16	.20	.09	.16	.08	.05	.02	.06	.07	.03	.03		
191	10	UNIV. OF WASHINGTON	.64	.62	1.0	.43	.55	.44	.30	.25	.26	.23	.17	.22	.17	.21	.17	.19	.15	.16	.11	.21	.18	.14	.20	.16	.12	.14	.08	.07	.04	.04	.07	.05	.02			
183	6	SEATTLE PUBLIC LIBRARY	.42	.43	.45	1.0	.38	.45	.46	.46	.48	.42	.37	.34	.37	.33	.33	.29	.30	.30	.23	.29	.21	.28	.22	.15	.24	.11	.19	.07	.04	.07	.05	.03				
172	6	CENT. WASH. STATE COLL.	.69	.77	.61	.41	1.0	.43	.30	.25	.26	.20	.14	.20	.15	.19	.14	.16	.26	.15	.10	.15	.29	.09	.19	.17	.11	.18	.05	.05	.03	.07	.05	.02				
139	8	WASHINGTON STATE LIB.	.53	.54	.60	.60	.54	1.0	.41	.38	.41	.36	.27	.29	.24	.29	.26	.25	.23	.23	.17	.22	.22	.19	.25	.19	.17	.17	.09	.08	.04	.09	.08	.06	.03			
120	0	TACOMA PUBLIC LIBRARY	.44	.43	.48	.73	.46	.48	1.0	.52	.53	.53	.53	.48	.48	.46	.45	.39	.38	.38	.32	.40	.18	.38	.28	.16	.34	.18	.25	.17	.13	.08	.09	.04	.02			
112	2	KING COUNTY LIBRARY	.42	.38	.43	.75	.38	.47	.55	1.0	.54	.54	.46	.53	.51	.46	.46	.40	.37	.41	.33	.38	.21	.37	.26	.14	.34	.17	.27	.13	.09	.08	.06	.04	.02			
107	1	PIERCE COUNTY LIBRARY	.44	.44	.46	.81	.42	.53	.60	.57	1.0	.56	.53	.48	.58	.43	.51	.45	.36	.46	.38	.41	.21	.38	.29	.11	.38	.09	.28	.16	.10	.08	.07	.05	.04			
107	1	SPOKANE PUBLIC LIBRARY	.39	.34	.40	.72	.33	.47	.60	.56	.56	1.0	.54	.46	.57	.45	.45	.40	.37	.44	.37	.39	.15	.41	.20	.09	.33	.15	.29	.16	.11	.06	.07	.04	.04			
90	2	SPOKANE COUNTY LIBRARY	.34	.34	.36	.74	.27	.42	.70	.58	.67	.64	1.0	.52	.61	.49	.57	.40	.42	.49	.39	.47	.10	.53	.24	.10	.39	.08	.36	.22	.12	.06	.06	.03	.04			
87	0	LONGVIEW PUBLIC LIBRARY	.34	.46	.49	.71	.40	.46	.54	.68	.59	.56	.54	1.0	.62	.52	.46	.43	.44	.47	.36	.43	.20	.37	.26	.15	.37	.15	.31	.14	.11	.09	.09	.05	.03			
87	0	SNO-ISLE REGIONAL LIB.	.34	.36	.38	.78	.29	.37	.66	.66	.71	.70	.63	.61	1.0	.53	.47	.46	.48	.45	.47	.17	.45	.22	.13	.43	.09	.33	.14	.14	.07	.08	.08	.05	.03			
86	0	YAKIMA VALLEY REG. LIB.	.44	.37	.48	.70	.38	.47	.64	.60	.53	.56	.51	.52	.53	1.0	.44	.40	.35	.43	.38	.38	.19	.41	.27	.13	.33	.19	.33	.17	.13	.12	.08	.08	.05			
79	0	TIMBERLAND REG. LIB.	.41	.38	.42	.77	.32	.48	.68	.66	.71	.61	.65	.51	.67	.48	1.0	.46	.42	.48	.38	.43	.15	.47	.27	.09	.44	.05	.34	.18	.15	.04	.10	.04	.03			
68	0	BELLINGHAM PUBLIC LIB.	.46	.43	.53	.78	.40	.40	.69	.66	.71	.63	.53	.54	.60	.50	.53	1.0	.44	.41	.41	.43	.24	.46	.38	.13	.38	.16	.34	.18	.13	.12	.07	.03				
67	1	EVERETT PUBLIC LIBRARY	.39	.36	.43	.81	.37	.48	.67	.61	.58	.60	.57	.57	.60	.45	.49	.45	1.0	.57	.33	.43	.13	.42	.22	.13	.34	.16	.33	.19	.15	.07	.09	.04	.01			
64	0	RICHLAND PUBLIC LIBRARY	.42	.39	.50	.86	.39	.50	.72	.72	.77	.73	.69	.64	.66	.58	.59	.44	.59	1.0	.47	.56	.16	.56	.27	.13	.44	.14	.34	.20	.13	.08	.09	.06	.05			
62	0	FT. VANCOUVER REG. LIB.	.37	.37	.34	.68	.29	.39	.61	.60	.66	.66	.56	.52	.63	.53	.48	.45	.35	.48	1.0	.37	.18	.47	.24	.13	.45	.16	.26	.19	.11	.11	.08	.08	.05			
62	0	KITSAP COUNTY REG. LIB.	.39	.42	.52	.85	.42	.48	.77	.68	.71	.68	.68	.60	.66	.52	.53	.48	.47	.58	.37	1.0	.16	.53	.26	.15	.50	.13	.40	.19	.13	.11	.08	.06	.06			
62	0	SEATTLE COMM. COLLEGE	.58	.53	.56	.63	.53	.50	.35	.39	.35	.26	.15	.27	.24	.26	.19	.26	.15	.16	.18	.16	1.0	.16	.31	.37	.10	.21	.05	.08	.05	.15	.16	.06	.05			
59	0	MID-COLUMBIA REG. LIB.	.39	.34	.44	.86	.27	.46	.76	.69	.69	.75	.81	.54	.66	.59	.63	.53	.47	.61	.49	.56	.17	1.0	.27	.14	.49	.10	.44	.25	.15	.12	.08	.05	.07			
55	1	TACOMA COMMUNITY COLL.	.56	.56	.71	.73	.60	.64	.60	.53	.56	.38	.40	.42	.35	.40	.38	.47	.27	.31	.27	.31	.35	.29	1.0	.15	.27	.22	.13	.13	.09	.15	.13	.13	.07			
54	2	SHORELINE COMM. COLL.	.65	.72	.56	.52	.57	.50	.22	.30	.22	.19	.17	.24	.20	.20	.13	.17	.17	.15	.15	.17	.43	.15	.15	1.0	.13	.24	.04	.06	.02	.09	.13	.04	.02			
52	0	WALLA WALLA PUB. LIB.	.38	.35	.42	.85	.37	.46	.79	.73	.79	.67	.67	.62	.71	.54	.67	.50	.44	.54	.60	.12	.56	.29	.13	1.0	.12	.40	.21	.13	.12	.08	.66	.04				
45	0	EAST. WASH. STATE COLL.	.64	.69	.62	.49	.71	.53	.49	.42	.22	.36	.16	.29	.18	.36	.13	.24	.24	.20	.22	.18	.29	.13	.27	.29	.13	1.0	.13	.02	.07	.18	.13	.09	.02			
42	0	NO. CENTRAL REG. LIB.	.36	.36	.38	.83	.21	.29	.71	.71	.71	.74	.76	.64	.69	.67	.64	.55	.52	.52	.33	.60	.07	.62	.17	.05	.50	.14	1.0	.21	.19	.02	.10	.05	.05			
23	0	PULLMAN PUBLIC LIBRARY	.39	.43	.57	.83	.39	.52	.87	.61	.74	.74	.87	.52	.57	.65	.61	.52	.57	.61	.52	.52	.52	.22	.65	.30	.13	.48	.04	.39	1.0	.13	.13	.13	.04	.04		
17	0	WHATCOM CO. REG. LIB.	.29	.24	.41	.76	.29	.29	.88	.59	.65	.71	.65	.59	.71	.65	.71	.71	.59	.47	.41	.47	.18	.53	.29	.06	.41	.18	.47	.18	1.0	.18	.18	.06	.00			
17	0	YAKIMA VALLEY COLLEGE	.59	.65	.71	.82	.71	.76	.59	.53	.53	.35	.29	.47	.35	.59	.35	.53	.29	.29	.41	.41	.53	.41	.47	.29	.35	.47	.06	.18	.18	1.0	.18	.24	.66			
16	0	EVERETT COMM. COLLEGE	.75	.81	.75	.81	.63	.63	.69	.44	.50	.44	.31	.50	.44	.44	.50	.50	.38	.33	.31	.31	.56	.31	.38	.38	.25	.38	.25	.19	.19	.29	1.0	.13	.19			
11	0	GREEN RIVER COMM. COLL.	.64	.55	.82	.82	.73	.73	.45	.36	.45	.36	.27	.36	.36	.64	.27	.45	.27	.45	.27	.36	.45	.36	.36	.27	.64	.18	.27	.36	.18	.09	.36	.18	1.0	.09		
7	0	CENTRALIA COMM. COLLEGE	.43	.71	.57	.57	.43	.57	.29	.57	.29	.57	.57	.43	.57	.43	.57	.29	.29	.14	.43	.57	.43	.57	.43	.57	.57	.14	.29	.14	.29	.00	.14	.43	.14	1.0		

REFERENCES

1. Caution should be used in making comparisons between libraries recorded as having in excess of about 180 titles. For example, the University of Washington's title acquisitions in 1968 exceeded 30,000. Considerable purchasing, therefore, was made from titles outside the sampled universe of American imprints.
2. The average number of duplicate copies held by libraries is approximated by that library's volume to title ratio. Multiple volume sets do not appear to be sufficient in number to distort the volume/title ratio as a reasonably high average.

APPENDIX B BOOK CIRCULATION CHARACTERISTICS

Discussion of collection management in Chapter 4 is partially dependent on the concept of low circulation volumes and this in turn requires a knowledge of yearly circulation rates and other characteristics of books and their use. This appendix consists of such data and includes results derived from them. There were four libraries whose circulations were studied extensively. The Washington State Library, Seattle Public Library, Central Washington State College Library and Bellingham Public Library.

B.1 Methodology

All circulation studies were carried out by means of sampling in the four libraries mentioned above. However, the size of samples varied over a wide range because of both the availability of data and the time constraints of the study.

Two main samples were drawn and analyzed at the Washington State Library. One was a sample of approximately 1,800 books in circulation. This was drawn by intercepting and recording data from all books returned over a three-day period. Various data items were recorded such as call number, date of publication, date circulated, etc. The information gathered was used in producing Tables B.1, B.3 and B.13. The second sample consisted of 1,490 items drawn from the shelf list by taking the n th card from the k th draw. K was a function of the number of draws and n was selected randomly.

For each item the following information was recorded:

- a) Complete call number
- b) Brief author and title
- c) Date of publication

When the sample was completely drawn and recorded a search for each item was made on the shelves and in the circulation file.

When the item was located the following information was recorded:

- a) Number of times circulated in each year as recorded on the book card.
- b) Full date (month, day, and year of the last circulation.)

This sample was analyzed to produce Tables B.4 through B.7

One circulation sample was drawn and analyzed at the Seattle Public Library. This consisted of items returned to the circulation desk in the main library and in three branches over a period of 3 days. Data recorded was the same as for the first State Library sample described above. Analysis resulted in Tables B.1, B.3, and B.12.

Samples of circulation from Central Washington State College Library and Bellingham Public Library are similar in that they consist of complete circulation records for a fixed period of time in machine readable form. For Central Washington this was an eighteen-month period from January 2, 1968, to June 30, 1969. The sample consisted of 75,365 circulations of 30,876 titles. The Bellingham sample covered the period from January 2, 1970, through March 31, 1970. The sample consisted of 111,833 circulations of 34,724 titles. The analysis of these samples is described in more detail in section B.2 below. This analysis produced tables B.8 through B.11 and Figures B.6 and B.7.

Additional data were collected in libraries visited by the research team. These were in most cases precollected statistics relating to the subject distribution of circulation and had been gathered by the individual library administrators in the course of their normal operations. Presentation of these data is given in Tables B. 1 and B.2.

B.2 Computer Analysis of Circulation Records

During the course of the study, the research team gained access to complete circulation records in machine-readable form for Central Washington State College Library and Bellingham Public Library. These records were analyzed by computer to extract various kinds of needed information. This section describes the institutions, the records and the analysis and presents sample outputs and a program listing. Results of the analysis are presented in section B.5.

Central Washington State College is located in Ellensburg. It has been in existence since 1890, and started as the Washington State Normal School. It began granting master's degrees in 1947, and at present offers undergraduate majors in 42 subject areas and master's degrees in 10 subjects plus the Master of Education degree in 26 specialties. Enrollment was 9,266 in the fall of 1968.

The Bellingham Public Library was founded in 1904 and presently serves a population of 38,000 people. It has two branch libraries in addition to its main headquarters. The city of Bellingham is a mixed suburban and light industrial city with one of the four state colleges located there. The reported total for number of volumes in the collection was 124,011 at the end of 1969. Circulation for the calendar year 1969 was reported as 411,993.

In general the techniques of analysis for both data sets were the same. Essentially the same computer program was used for both analyses and the outputs were essentially identical. Therefore, the description given here will deal with the Central Washington sample and parenthetical notes will indicate any unique characteristics of the Bellingham data or analysis.

Both libraries have circulation control systems based on the IBM 357 machine configuration. This machine set produces for each charge out, an 80 column punched card carrying book and borrower identification information. Upon return of the book another card is generated carrying book information but indicating that an existing charge, represented by the card previously produced, is to be cancelled. The charge out and return cards are matched and the charges cancelled.

The first step taken when the cards for CWSC were received was to sort them by call number and transfer the data to tape. The various data elements were reorganized into a different fixed format at this time to facilitate future manipulation. To insure accuracy a print of the entire data base was then obtained to check for any unforeseen problems. (This was not done with the Bellingham data since the program had been developed to a point of sufficient confidence). An analysis of the print-out revealed that the only major problem was concerned with counting different titles which had circulated. When the data were arrayed by titles (see figure B.1) the machine sort was performed on the whole call number. If the call number differed from the one previously checked in any way, the program considered it a new "title". In some cases this meant that different volumes or different copies of the same work would be counted as different titles if a volume or copy designation appeared in the call number. In order to include circulations of multi-volume or multi-copy works under one "title" we established the following logic. If call number 2 (the one being counted) is identical to call number 1 (the one counted immediately previously) except for a difference in the last three characters and two of those last three are either "c." or "v.", count this as an additional circulation of the previous title. If the call numbers are completely identical count this as an additional circulation of the previous title. If these criteria are not met consider this a net title.

The final step was to generate a frequency distribution of the number of circulations per title circulated. Sample pages from the distributions for C. W. S. C. and Bellingham are shown in figures B.2 and B.3 respectively. The parameters were chosen to show the number of titles which circulated 1, 2, 3, . . . 24 and over 24 times in the period. Twenty-four was chosen arbitrarily as the upper bound and seems adequate since only .099 percent of the titles at C.W.S.C. circulated more than this number. (.43 percent of the titles at Bellingham.) The distribution is broken down by subject to the level of two letters in LC, e.g. "QA", "QB". (The hundreds and tens digits in Dewey on the Bellingham distribution, e.g. 010-019 +, 020-029+).

The program listing is given in figure B.4.

SAMPLE PAGE FROM PRINT-OUT OF CENTRAL WASHINGTON STATE COLLEGE CIRCULATION DATA BASE

FIGURE B.1

AUTHOR AND TITLE

CLASS	CALL NUMBER	ACCESS NUMBER	CHARGE YR DAY	RETURN YR DAY	TIME OUT	USER CODE	USER NUMBER	DUR	AUTHOR AND TITLE
AS	0036475V.2	001019	69 030			0	6534350	2	MISSOURI.-NORTHWEST-MISSOURI-STA-
AS	0036475V.2	001019	69 121			0	6913500	2	MISSOURI.-NORTHWEST-MISSOURI-STA-
AS	028466V.64	001103	69 019			4	7529392	2	HAGENDAHN-HARALD LATIN-FATHERS-AND--
AS	028466V.64	001103	69 034			0	3370170	2	HAGENDAHN-HARALD LATIN-FATHERS-AND--
*** CLASS TOTAL TOTAL									
AS	ENTRY 10	CALL NUMBERS 5							
CLASS	CALL NUMBER	ACCESS NUMBER	CHARGE YR DAY	RETURN YR DAY	TIME OUT	USER CODE	USER NUMBER	DUR	AUTHOR AND TITLE
AZ	0101J6	132541	68 148			0	5638670	2	JONES-WILLIAM-THOMAS THE-ROMANTIC-SYNDROME-----
AZ	0105J64	139501	68 025			3	7141756	2	JONES-WILLIAM-THOMAS SCIENCES-AND-HUMANITIES---
AZ	0108K62-19	000787	68 304			0	5307310	2	KOCH-RUDOLF BOOK-OF-SIGNS-WHICH-CONT-
AZ	0108K62-19	000787	68 331			0	1288980	2	KOCH-RUDOLF BOOK-OF-SIGNS-WHICH-CONT-
AZ	0108K62-19	078794	68 190			4	2364257	2	KOCH-RUDOLF BOOK-OF-SIGNS-WHICH-CONTAINS--
AZ	0108K62-19	078794	68 207			0	4577290	2	KOCH-RUDOLF BOOK-OF-SIGNS-WHICH-CONTAINS--
AZ	0221J3	000324	68 277			0	9500390	2	JASTRON-JOSEPH STORY-OF-HUMAN-ERROR-----
AZ	0361G7-196	001528	69 091			0	7032500	2	GREEN-HARTIN-BURGESS SCIENCE-AND-THE---
AZ	0361S56	000961	69 024			0	7033760	2	SNOW-CHARLES-PERCY TWO-CULTURES-AND-THE-S-
AZ	0361S56	000961	69 091			0	7032500	2	SNOW-CHARLES-PERCY TWO-CULTURES-AND-THE-S-
AZ	0361S56	000961	69 100			0	1985520	2	SNOW-CHARLES-PERCY TWO-CULTURES-AND-THE-S-
AZ	0361S57L4	001321	68 303			0	8938460	2	LEAVIS-FRANK-RAYMO-D TWO-CULTURES-----
AZ	0361S57L4	001321	68 317			0	8938460	2	LEAVIS-FRANK-RAYMO-D TWO-CULTURES-----
AZ	0505C8	076078	68 029			3	7141756	2	CURTI-HERLE-EUGENE AMERICAN-SCHOLARSHIP-IN-THE--
AZ	0505C8	076078	68 155			3	2143324	2	CURTI-HERLE-EUGENE AMERICAN-SCHOLARSHIP-IN-THE--
AZ	0507C6C.4	143020	68 029			3	7141756	2	COMMISSION-ON-THE-HUMANITIES REPORT-----
AZ	0515A53	075285	68 065			0	9061790	2	CANADA.-ROYAL-COMMISSION-ON-NATIONAL-DEVELOPME-
AZ	0604S3-196	001580	69 092			0	6603090	2	SCHENK-HANS-GEORG-ARTUR-VIKTOR MIND-O-
AZ	0604S3-196	001580	69 124			0	6603090	2	SCHENK-HANS-GEORG-ARTUR-VIKTOR MIND-O-
AZ	0613H4-196	001665	68 270			3	1321665	2	WEISS-ROBERTO HUMANISM-IN-ENGLAND-DUR-
AZ	0999H2-195	001125	69 023			0	3205500	2	NACKAY-CHARLES EXTRAORDINARY-POPULAR---
AZ	0999H6	001570	69 058			0	4894160	2	MONTAGU-ASHLEY PREVALENCE-OF-NONSENSE,-196-

*** CLASS TOTAL TOTAL
AZ ENTRY 22 CALL NUMBERS 14

CLASS	NUMBER OF TIMES CHECK OUT																								OVER
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
AC	2	1		1																					
AG	2				1																				
AS	1	2																							
AZ	9	3	1	1																					
INT																									
TOTAL	14	6	1	2	2																				
B	1																								
B-	281	139	77	54	30	18	12	8	4	2	1	1	2	1	2										
BC	33	13	2	1	1	1	1	1																	
BD	59	20	5	9	1	2		1																	
BF	382	255	175	121	93	65	50	39	22	11	15	15	3	4	3	4	1	1				1			10
BH	18	1			1	1																			
BJ	71	23	15	4	1		1	1																	
BL	91	48	31	27	17	10	7	2	4	2						1	1								
BM	20	4		2	2	1																			
BP	6	4		1																					
BR	66	26	19	9	7	3	1																		
BS	35	11	7	1	1																				
BT	21	7	2	2		1																			
BV	28	7	2	1	1																				
BX	68	33	22	10	9	2	1	2		1															
INT																									
TOTAL	1180	591	357	242	164	104	72	53	31	15	17	16	5	5	5	5	2	1				1			10
CB	55	29	14	7	6																				
CC	10																								
CD	1																								
CE	3																								
CR	4		2																						
CS	2																								
CT	28	10	4		2	1																			
INT																									
TOTAL	103	41	22	7	8	1																			
D	2																								
D-	293	126	62	31	14	8	4	2	1	1	1	1			2		1							1	
DA	208	103	52	38	25	12	5	4	4	1	1	1	1	1											
DB	15	10	4	2	4	3	1	2	2	1	1	1													

FIGURE B.3
NUMBER OF TIMES CHECK OUT

CLASS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

OVER 24

30	174	120	92	55	28	19	9	5	5	1	1	1											
31	13	3	3	1																			
32	260	113	60	13	12	3	2	4	2	1	1	1											
33	217	98	55	32	15	12	5	2	2	1	1	1	3										
34	104	58	20	9	4	1	2	2	1	1	2		1	2									
35	157	64	41	19	9	11	5	4	1	1	1	1											
36	139	86	57	27	17	21	6	7	5	5	4	4	2	2									
37	159	90	41	33	17	11	4	3	1	1	1	1	1										
38	65	23	13	13	9	5	3	2	2	3	1	1											
39	150	83	35	25	5	8	1																

INT TOTAL 1438 738 417 227 116 91 35 29 20 13 10 6 3 7 4 1 1 1 1

40	3																						
41	15	4	1	1																			
42	38	14	6	4																			
43	9	6	6	3	2																		
44	6	2	2		1																		
45	2	2	7	1	1																		
46	2	7	7	1	1																		
47	3	2																					
48	4	1																					
49	8	5	4	2	1																		

INT TOTAL 90 43 28 11 5 1

50	44	13	11	7	6	3	1	1															
51	65	47	22	7	2	1																	
52	58	33	20	11	6	1																	
53	75	16	6	4	1																		
54	34	15	9	6	1																		
55	109	57	38	17	7																		
56	13	9	3	1	3																		
57	129	73	39	27	8	3	2	1															
58	91	55	26	18	6	2	1	2															
59	217	135	77	54	39	22	9	2	2	4	1	1	1										

INT TOTAL 835 463 251 152 79 32 17 6 4 6 5 1 2 1 1 1 1

F

000001	001010	IDENTIFICATION DIVISION.	VEGB0106
000002	001020	PROGRAM-ID.	VEGB0106
000003	001030	AUTHOR.	VEGB0106
000004	001040	INSTALLATION.	VEGB0106
000005	001050	DATE-WRITTEN.	VEGB0106
000006	001060	DATE-COMPILED.	VEGB0106
000007	001070	ENVIRONMENT DIVISION.	VEGB0106
000008	001130	ENVIRONMENT DIVISION.	VEGB0106
000009	001140	CONFIGURATION SECTION.	VEGB0106
000010	001150	SOURCE-COMPUTER.	VEGB0106
000011	001160	OBJECT-COMPUTER.	VEGB0106
000012	001170	INPUT-OUTPUT SECTION.	VEGB0106
000013	001180	FILE-CONTROL.	VEGB0106
000014	001190	SELECT IN-REC	VEGB0106
000015	001200	SELECT OUT-REC	VEGB0106
000016	001210	DATA DIVISION.	VEGB0106
000017	001220	FILE SECTION.	VEGB0106
000018			VEGB0106
000019	002010	FD IN-REC	VEGB0106
000020	002020	RECORDING MODE IS F	VEGB0106
000021	002030	RECORD CONTAINS 80 CHARACTERS	VEGB0106
000022	002040	BLOCK CONTAINS 0 RECORDS	VEGB0106
000023	002050	LABEL RECORDS ARE OMITTED	VEGB0106
000024	002024	DATA RECORDS ARE INPUT-REC INPUT-REC-2.	VEGB0106
000025	002025	INPUT-REC-2.	VEGB0106
000026	002026	05 FILLER	VEGB0106
000027	002027	05 ID-PR-2	VEGB0106
000028	002028	05 FILLER	VEGB0106
000029	002029	05 USER-CODE-2	VEGB0106
000030	002030	05 USER-NR	VEGB0106
000031	002031	05 POS-24	VEGB0106
000032	002032	05 DUR-2	VEGB0106
000033	002033	05 POS-26	VEGB0106
000034	002034	05 FILLER	VEGB0106
000035	002035	INPUT-REC.	VEGB0106
000036	002080	05 OUT-YP-DV.	VEGB0106
000037	002090	10 OUT-YP	VEGB0106
000038	002100	10 FILLER	VEGB0106
000039	002110	05 COL5-13-1.	VEGB0106
000040	002120	10 TYPE	VEGB0106
000041	002125	RR TYPE1	VEGB0106
000042	002130	10 ACCESS-1	VEGB0106
000043	002140	10 FILLER	VEGB0106
000044	002150	05 COL5-13-2	VEGB0106
000045	002160	10 FILLER	VEGB0106
000046	002170	10 ACCESS-2	VEGB0106
000047	002180	05 USER-COD-IN	VEGB0106
000048	002190	05 USER-NO	VEGB0106
000049	002200	05 FILLER	VEGB0106
000050	002210	05 DUR-IN	VEGB0106
000051	002220	05 VARY-FLD	VEGB0106
000052	002230	05 REDEF-VARY	VEGB0106
000053	002240	10 VARY-ITEM	VEGB0106
000054	003010	FD OT-REC	VEGB0106
000055			VEGB0106

FIGURE B.4, cont.

```
00056 003020 RECORDING MODE IS P VEGBO106
00057 003030 RECORD CONTAINS 120 CHARACTERS VEGBO106
00058 003040 BLOCK CONTAINS 0 RECORDS VEGBO106
00059 003050 LABEL RECORDS ARE STANDARD VEGBO106
00060 003060 DATA RECORD IS OUTPUT-REC. VEGBO106
00061 003070 01 OUTPUT-REC VEGBO106
00062
00063 003100 WORKING-STORAGE SECTION.
00064 003110 77 FILLER VALUE 'WDPK AREA STARTS HERE' VEGBO106
00065 003120 77 SUBS-IN VALUE 0 COMPUTATIONAL VEGBO106
00066 003130 77 SUBS-OUT VALUE 0 COMPUTATIONAL VEGBO106
00067
00068 004010 01 WK-OUT. VEGBO106
00069 004020 05 FILLER VEGBO106
00070 004030 05 BK-ALF1 VEGBO106
00071 004040 05 BK-ALF2 VEGBO106
00072 004050 05 BK-NUM OCCURS 10 TIMES VEGBO106
00073 004060 05 ACC-NO VEGBO106
00074 004070 05 INSERT-YP VEGBO106
00075 004080 05 OUT-DATE VEGBO106
00076 004090 05 FILLER VEGBO106
00077 004100 05 DUPLICATION VEGBO106
00078 004110 05 FILLER VEGBO106
00079 004120 05 USER-COD VEGBO106
00080 004130 05 USER-NMNR VEGBO106
00081 004140 05 FILLER VEGBO106
00082 004150 05 AUTH-TITLE VEGBO106
00083 004160 05 REDEF-AUTH REDEFINES AUTH-TITLE. VEGBO106
00084 004170 10 SINGLE-AUTH OCCURS 68 TIMES VEGBO106
00085
00086 005010 01 STAT-LINE. VEGBO106
00087 005020 05 FILLER VEGBO106
00088 005030 05 TOTAL RECORDS IN VEGBO106
00089 005040 05 CT-IN VALUE 0 VEGBO106
00090 005050 05 FILLER VEGBO106
00091 005060 05 TOTAL RECORDS OUT VEGBO106
00092 005070 05 CT-OT VALUE 0 VEGBO106
00093
00094 010010 PROCEDURE DIVISION. VEGBO106
00095 010020 OPEN INPUT IN-RFC, OUTPUT OT-RFC. VEGBO106
00096
00097 READ-REC. VEGBO106
00098 READ IN-REC AT END GO TO CLOSE-UP. VEGBO106
00099 IF CT-IN 200 GO TO CLOSE-UP. VEGBO106
01000 MOVE 'AA' TO WK-OUT. VEGBO106
01001 IF OUT-YP '0' MOVE '7' TO INSERT-YP ELSE VEGBO106
01002 MOVE '6' TO INSERT-YP. VEGBO106
01003 MOVE OUT-YP-DY TO OUT-DATE. VEGBO106
01004 IF POS-24 H 'A' OF 'Z' GO TO CHECK-REC-2. VEGBO106
01005 MOVE ACCESS-2 TO ACC-NO. VEGBO106
01006 MOVE USER-COD-IN TO USER-COD. VEGBO106
01007 MOVE USER-NO TO USER-NMNR. VEGBO106
01008 MOVE DUR-IN TO DURATION. VEGBO106
01009 MOVE 1 TO SUBS-OUT, MOVE 2 TO SUBS-IN. VEGBO106
01010 MOVE VARY-ITEM (1) TO BK-ALF1. VEGBO106
01011 IF VARY-ITEM (2) = '0' OR '9' NEXT SENTENCE ELSE VEGBO106
01012
```

FIGURE B.4, cont.

```
00113 001175      GO TO LOOP-BOOK.
00114 001180      MOVF VARY-ITEM (2) TO BK-ALF2.
00115 001190      ADD 1 TO SUBS-IT.
00116
00117 001100  LOOP-BOOK.
00118 001120      IF SUBS-IN 57 GO TO MOVE-WORK.
00119 001130      IF VAPY-ITEM (SUBS-IN) '*', ADD 1 TO SUBS-IN,
00120 001140      MOVE 1 TO SUBS-OUT, GO TO LOOP-TITLE.
00121 001150      IF SUBS-OUT 10 ADD 1 TO SUBS-IN, GO TO LOOP-BOOK.
00122 001160      MOVF VARY-ITEM (SUBS-IN) TO RK-NUM (SUBS-OUT).
00123 001170      ADD 1 TO SUBS-IN, ADD 1 TO SUBS-OUT.
00124 001180      GO TO LOOP-BOOK.
00125
00126 001190  LOOP-TITLE.
00127 001200      MOVE VARY-ITEM (SUBS-IN) TO SINGLE-AUTH (SUBS-OUT).
00128 001210      IF SUBS-IN 57 ADD 1 TO SUBS-IN, ADD 1 TO SUBS-OUT,
00129 001220      GO TO LOOP-TITLE.
00130 001230      EXAMINE AUTH-TITLE REPLACING ALL '*' BY SPACE.
00131
00132 001140  MOVE-WORK.
00133 001150      MOVE WK-OUT TO OUTPUT-REC.
00134 001160      WRITE OUTPUT-REC.
00135 001170      ADD 1 TO CT-OT.
00136 001180      GO TO READ-REC.
00137
00138 001200  CLOSE-UP.
00139 001210      DISPLAY STAT-LINE.
00140 001220      CLOSE IN-REC, OT-REC.
00141 001230      STOP RUN.
00142      CHECK-REC-2.
00143      IF POS-26 0 'A' OR 'Z' GO TO READ-REC.
00144      MOVE ID-NR-2 TO ACC-NO.
00145      MOVE USER-CODE-2 TO USER-COD.
00146      MOVE USER-NR TO USER-NHBR.
00147      MOVE DUR-2 TO DURATION.
00148      MOVE POS-26 TO BK-ALF1.
00149      MOVE 4 TO SUBS-IN, MOVE 1 TO SUBS-OUT.
00150      IF VAPY-ITEM (4) 0 '0' OR '9' NEXT SENTENCE ELSE
00151      GO TO LOOP-BOOK.
00152      MOVE VARY-ITEM (4) TO BK-ALF2.
00153      ADD 1 TO SUBS-IN.
00154      GO TO LOOP-BOOK.
```

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FIGURE B.4, cont.

INTRNL NAME	LVL	SOURCE NAME	BASE	DISPL	INTRNL NAME	DEFINITION	USAGE	R	O	Q
DNM 1-127	FD	IN-REC	DCB 01		DNM 1-127		QSM			
DNM 1-145	01	INPUT-REC-2	BLI 1	000	DNM 1-145	DS OCL80	GROUP			
DNM 1-168	02	FILLER	BLI 1	000	DNM 1-163	DS 5C	DISP			
DNM 1-183	02	FD-NP-2	BLI 1	005	DNM 1-183	DS 8C	DISP			
DNM 1-199	02	FILLER	BLI 1	000	DNM 1-199	DS 2C	DISP			
DNM 1-217	02	HEADER-CODE-2	BLI 1	00E	DNM 1-217	DS 1C	DISP			
DNM 1-237	02	USER-NR	BLI 1	010	DNM 1-237	DS 7C	DISP			
DNM 1-253	02	POS-24	BLI 1	017	DNM 1-253	DS 1C	DISP			
DNM 1-268	02	DNR-2	BLI 1	019	DNM 1-268	DS 1C	DISP			
DNM 1-282	02	POS-26	BLI 1	019	DNM 1-282	DS 1C	DISP			
DNM 1-297	02	FILLER	BLI 1	01A	DNM 1-297	DS 54C	DISP			
DNM 1-315	01	INPUT-REC	BLI 1	000	DNM 1-315	DS OCL80	GROUP			
DNM 1-336	02	OUT-YR-DY	BLI 1	000	DNM 1-336	DS OCL4	GROUP			
DNM 1-360	03	OUT-YR	BLI 1	000	DNM 1-360	DS 1C	DISP			
DNM 1-375	03	FILLER	BLI 1	001	DNM 1-375	DS 3C	DISP			
DNM 1-393	02	COL5-13-1	BLI 1	004	DNM 1-393	DS OCL9	GROUP			
DNM 1-417	03	TYPER	BLI 1	004	DNM 1-417	DS 1C	DISP			
DNM 1-434	03	TYPE1	BLI 1	005	DNM 1-434					
DNM 1-450	03	ACCESS-1	BLI 1	005	DNM 1-450	DS 6C	DISP			
DNM 1-467	03	FILLER	BLI 1	008	DNM 1-467	DS 2C	DISP			
DNM 1-485	02	COL5-13-2	BLI 1	004	DNM 1-485	DS OCL9	GROUP			*
DNM 2-000	03	FILLER	BLI 1	004	DNM 2-000	DS 3C	DISP			
DNM 2-018	03	ACCFSS-2	BLI 1	007	DNM 2-018	DS 6C	DISP			
DNM 2-035	02	USER-COB-IN	BLI 1	00D	DNM 2-035	DS 1C	DISP			
DNM 2-055	02	USER-NO	BLI 1	00E	DNM 2-055	DS 7C	DISP			
DNM 2-071	02	FILLER	BLI 1	015	DNM 2-071	DS 1C	DISP			
DNM 2-089	02	DUR-IN	BLI 1	016	DNM 2-089	DS 1C	DISP			
DNM 2-104	02	VARY-FID	BLI 1	017	DNM 2-104	DS 57C	DISP			
DNM 2-121	02	REDEF-VARY	BLI 1	017	DNM 2-121	DS OCL57	GROUP			*
DNM 2-143	03	VARY-ITEM	BLI 1	017	DNM 2-143	DS 1C	DISP			*
DNM 2-161	FD	OT-REC	DCB 02		DNM 2-161		QSM			
DNM 2-179	01	OUTPUT-REC	BLI 2	000	DNM 2-179	DS 120C	DISP			
DNM 2-213	77	FILLER	BLI 3	000	DNM 2-213	DS 21C	DISP			
DNM 2-231	77	SUBS-IN	BLI 3	016	DNM 2-231	DS 1H	COMP			
DNM 2-247	77	SURS-OUT	BLI 3	018	DNM 2-247	DS 1H	COMP			
DNM 2-267	01	FK-OUT	BLI 3	020	DNM 2-267	DS OCL120	GROUP			
DNM 2-285	02	FILLER	BLI 3	020	DNM 2-285	DS 3C	DISP			
DNM 2-303	02	FK-ALF1	BLI 3	023	DNM 2-303	DS 1C	DISP			
DNM 2-319	02	FK-ALF2	BLI 3	024	DNM 2-319	DS 1C	DISP			
DNM 2-338	02	FK-NUM	BLI 3	025	DNM 2-338	DS 1C	DISP			*
DNM 2-353	02	ACC-NO	BLI 3	02F	DNM 2-353	DS 6C	DISP			
DNM 2-363	02	INSERT-YR	BLI 3	035	DNM 2-363	DS 1C	DISP			
DNM 2-386	02	OUT-DATE	BLI 3	036	DNM 2-386	DS 4C	DISP			
DNM 2-403	02	FILLER	BLI 3	03A	DNM 2-403	DS 8C	DISP			
DNM 2-421	02	DURATION	BLI 3	042	DNM 2-421	DS 1C	DISP			
DNM 2-441	02	FILLER	BLI 3	043	DNM 2-441	DS 1C	DISP			
DNM 2-459	02	USER-COD	BLI 3	044	DNM 2-459	DS 1C	DISP			
DNM 2-476	02	USER-NMBR	BLI 3	045	DNM 2-476	DS 7C	DISP			
DNM 2-494	02	FILLER	BLI 3	04C	DNM 2-494	DS 8C	DISP			
DNM 3-000	02	AUTH-TITLE	BLI 3	054	DNM 3-000	DS 68C	DISP			
DNM 3-016	02	PEDEF-AUTH	BLI 3	054	DNM 3-019	DS OCL68	GROUP			*
DNM 3-041	01	SINGLE-AUTH	BLI 3	054	DNM 3-041	DS 1C	DISP			
DNM 3-061	01	STAT-LINE	BLI 3	098	DNM 3-061	DS OCL53	GROUP			
DNM 3-082	02	FILLER	BLI 3	098	DNM 3-082	DS 18C	DISP			

FIGURE B.4, cont.

INTRNL NAME	LVL	SOURCE NAME	BASE	DISPL	INTRNL NAME	DEFINITION	USAGE	R	O	Q
DNH 3-100	02	CT-IN	BLI 3	OAA	DNH 3-100	DS 6C	DISP-NH			
DNH 3-117	02	FILLER	BLI 3	ORO	DNH 3-117	DS 23C	DISP			
DNH 3-135	02	CT-OT	BLI 3	OC7	DNH 3-135	DS 6C	DISP-NH			

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B.3 Analysis of Circulation by Subject

Tables B.1 and B.2 present an analysis of circulations by subject for various libraries. All percentages are the result of sampling and are presented in both the Dewey Decimal and the Library of Congress classification systems. These tables could of course be consolidated by using the translation table discussed in Appendix A. Further analysis could be conducted by comparing these data with those given in Tables A.4 and A.6 dealing with book holdings. Some members of the research team intend to investigate this relationship, i.e. of percent of holdings versus percent of circulation more fully in the future.

B.4 Analysis of Circulation by Age

Table B.3 shows the distribution of circulation by age and by subject for the Washington State Library and the Seattle Public Library. This presentation results from analysis of the two samples of circulation described in section B.1. A comparison of this table with Table A.8, Age of Books in Collection, shows the marked effect of age of books on their circulation. It is interesting to note, however, that even though there are marked differences in median age of the two collections (from Table A.8) there is very little difference between the two libraries with regard to the median age of books in circulation. Figure B.5 presents the cumulative distribution function of age of books for the collection, circulation, and interlibrary loan requests received for the Washington State Library.

B.5 Circulation Rates and Analysis of Circulation Relative to Holdings

Tables B.4 through B.7 show the results of analysis of the sample of 1,490 books from the Washington State Library collection described in section B.1. "No of 0 Circs." is defined as the number of sample volumes published during the year shown in column 1 which did not circulate at all during the year under study (1968 or 1969).

Table B.8 is derived from the same sample of 1,490 volumes. Here the circulation of the volumes during years 1-10 after publication is shown. For example the circulations in year $n + 1$ included the circulation of books in 1968 which were published in 1967 as well as the circulations during 1962 of books published during 1961. In Figure B.6 the average annual circulation rates for $n + 1$ through $n + 10$ years are plotted.

The above provide evidence of the decreasing utilization of books with increasing age but reveal that those books which do circulate do so at a more or less constant rate except during the period shortly after publication. It is noteworthy also that, as Tables B.5 and B.7 show, approximately 80 percent of the titles which circulated at all did so only once or twice during the entire year.

Tables B.9 through B.12 and Figures B.7 and B.8 show the results of the computer analysis of circulation records for Central Washington State College Library and Bellingham Public Library. Again it is interesting to note the relatively small percentage of titles which circulated at all and the large percentage of titles which circulated only once or twice during the periods covered.

B.6 Length of Loan Period

Tables B.12 and B.13 show the results of analysis for length of actual circulation period for materials in the Seattle Public Library and the Washington State Library. The tables cover various types of printed materials.

TABLE B.1
PERCENT CIRCULATION BY SUBJECT -- DEWEY DECIMAL CLASSIFICATION

Library	000's	100's	200's	300's	400's	500's	600's	700's	800's	900's	Bio- graphy (920-9)	Fiction	Total	Sample Size	Total Annual Circulation
State Library	1.35	8.42	2.09	27.77	1.01	5.39	22.64	13.68	5.52	6.67	2.63	2.83	100.00	7,495	105,789
Seattle Public Adult	.32	5.06	2.14	9.80	.65	5.06	11.26	13.33	6.16	8.40	4.70	33.12	100.00	1,548	2,421,525
Juvenile	1.11	.16	.48	3.18	.64	5.72	2.23	2.70	1.75	3.18	4.93	73.94	100.00	629	1,425,567
Tacoma Public Adult	.22	2.19	1.53	11.69	.44	2.40	8.85	8.31	6.89	12.13	4.70	40.65	100.00	915	692,663
Juvenile	--	.23	.46	4.57	.46	3.42	1.60	6.39	.91	8.22	1.83	71.91	100.00	438	384,141
Yakima Valley Reg. Adult	.41	2.24	1.22	9.55	1.02	5.08	9.76	11.59	7.11	12.39	2.64	36.99	100.00	492	707,045
Juvenile	--	--	1.08	2.16	--	2.16	5.41	2.16	1.62	4.86	4.86	75.69	100.00	185	265,856
Kitsap County Reg. Adult	.61	2.91	1.09	5.63	.36	5.81	12.30	11.81	4.42	10.24	5.33	39.49	100.00	1,651	371,907
Puyallup Public Adult	.44	2.01	1.49	5.01	.22	2.21	7.24	6.32	17.93	9.36	4.17	43.60	100.00	43,676	64,080
Juvenile	1.33	.03	.42	4.60	.22	7.08	2.93	2.74	1.85	4.46	2.81	71.53	100.00	28,433	29,769
Wash. State Univ. (1)	1.20	7.62	2.40	26.15	.93	5.35	11.69	7.31	22.52	14.17	.66	--**	100.00	28,184	139,275
East.Wash.StateColl. (1)	.52	5.87	1.73	28.56	.26	7.85	13.55	11.82	14.92	14.92*	--	--**	100.00	1,159	96,356
West.Wash.StateColl. (1)	1.27	8.94	2.82	35.67	.68	10.56	7.74	9.22	6.64	16.00	.46	--	100.00	8,677	50,372
Green River C.C.	1.06	9.48	3.66	15.59	1.18	12.04	11.24	12.03	14.36	19.36*	--	--**	100.00	8,330	12,513
Yakima Valley C.C.	.40	7.30	1.26	44.40	1.97	4.01	5.10	7.83	8.08	12.59	4.32	2.74	100.00	6,741	28,699

* Includes Biography

** Fiction included in 800's

(1) See "Percent Circulation by Subject -- Library of
Congress Classification" for additional circulation
for this library

TABLE B.2
PERCENT CIRCULATION BY SUBJECT -- LIBRARY OF CONGRESS CLASSIFICATION

LIBRARY	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
Wash.StateUniv.(1)	.13	8.57	.60	8.85	4.54	3.85	3.38	21.58	2.79	.23	1.61	.70	4.89	20.35	8.73
East.Wash.St.Coll.(1)	0.00	5.85	.53	4.79	5.32	3.19	1.60	11.70	.53	0.00	7.45	.53	4.79	18.62	26.06
Cent.Wash.St.Coll.	.08	9.24	.59	9.64	4.28	2.62	3.52	16.22	6.64	.31	9.03	2.01	5.75	11.82	9.00
West.Wash.St.Coll.(1)	.12	8.81	.36	7.49	5.28	1.97	5.19	14.80	3.03	.24	6.91	.89	4.25	24.01	9.63

LIBRARY	R	S	T	U	V	Z	TOTAL	SAMPLE SIZE	TOTAL ANNUAL CIRCULATION
Wash.StateUniv.(1)	3.57	.92	2.85	1.12	.12	.62	100.00	22,403	110,725(2)
East.Wash.St.Coll.(1)	5.32	.53	.53	0.00	0.00	2.66	100.00	188	15,634(2)
Cent.Wash.St.Coll.	2.69	.92	3.81	.42	.07	1.34	100.00	31,698	86,746(2)
West.Wash.St.Coll.(2)	2.53	.58	2.12	.31	.06	1.42	100.00	19,542	113,974

- (1) See "Percent Circulation by Subject - Dewey Decimal Classification" for additional circulation for this library
 (2) Represents annual circulation of books classified in Library of Congress classification

TABLE B.3
AGE OF BOOKS IN CIRCULATION -- SEATTLE PUBLIC LIBRARY AND WASHINGTON STATE LIBRARY

JANUARY 1970

SUBJECT	000's				100's				200's			
	WASH. STATE LIBRARY		SEATTLE PUBLIC LIBRARY		WASH. STATE LIBRARY		SEATTLE PUBLIC LIBRARY		WASH. STATE LIBRARY		SEATTLE PUBLIC LIBRARY	
	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %
LIBRARY												
% OF TOT. CIRC.	1.35	0.32	0.32	8.42	5.05	2.09	2.14					
MEDIAN AGE	1962	1961	1965	1962	1965	1962	1959					
90% YEAR	1952	1959	1952	1952	1952	1954	1908					
YEAR	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %
1969	12.00	12.00	0.00	0.00	8.82	8.82	11.54	11.54	11.11	11.11	3.03	3.03
1968	8.00	20.00	0.00	0.00	8.82	17.64	10.26	21.80	11.11	22.22	0.00	3.03
1967	12.00	32.00	40.00	40.00	11.76	29.40	12.82	34.62	7.41	29.63	6.06	9.09
1966	8.00	40.00	0.00	40.00	5.88	35.28	11.54	46.16	3.70	33.33	6.06	15.15
1965	4.00	44.00	0.00	40.00	14.71	49.99	6.41	52.57	0.00	33.33	0.00	15.15
1964	0.00	44.00	0.00	40.00	5.88	55.87	8.97	61.54	7.41	40.74	8.03	18.18
1963	4.00	48.00	0.00	40.00	2.94	58.81	2.56	64.10	3.70	44.44	12.12	30.30
1962	4.00	52.00	0.00	40.00	5.88	64.69	3.85	67.95	3.70	48.14	3.03	33.33
1961	8.00	60.00	20.00	60.00	4.41	69.10	6.41	74.36	11.11	59.25	6.06	39.39
1960	16.00	76.00	20.00	80.00	4.41	73.51	3.85	78.21	7.41	66.66	3.03	42.42
1959	4.00	80.00	20.00	100.00	4.41	77.92	1.28	79.49	0.00	66.66	3.03	45.45
1958	0.00	80.00	0.00	100.00	4.41	82.33	1.28	80.77	7.41	74.07	12.12	57.57
1957	0.00	80.00	0.00	100.00	1.47	83.80	2.56	83.33	7.41	81.48	6.06	63.63
1956	4.00	84.00	0.00	100.00	2.94	86.74	1.28	84.61	3.70	85.18	3.03	66.66
1955	0.00	84.00	0.00	100.00	0.00	86.74	1.28	85.89	0.00	85.18	3.03	69.69
1954	0.00	84.00	0.00	100.00	0.00	86.74	2.56	88.45	7.41	92.59	6.06	75.75
1953	4.00	88.00	0.00	100.00	1.47	88.21	1.28	89.73	0.00	92.59	0.00	75.75
1952	4.00	92.00	0.00	100.00	1.47	89.68	0.00	89.73	0.00	92.59	0.00	75.75
1951	0.00	92.00	0.00	100.00	1.47	91.15	1.28	91.01	0.00	92.59	0.00	75.75
1950	4.00	96.00	0.00	100.00	0.00	91.15	0.00	91.01	0.00	92.59	3.03	78.78
Before 1950	4.00	100.00	0.00	100.00	8.85	100.00	8.99	100.00	7.41	100.00	21.22	100.00

TABLE B.3, cont.
AGE OF BOOKS IN CIRCULATION -- SEATTLE PUBLIC LIBRARY AND WASHINGTON STATE LIBRARY

(continued)

SUBJECT LIBRARY	300's				400's				500's			
	WASH.	STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH.	STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH.	STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH.	STATE LIBRARY	SEATTLE PUBLIC LIBRARY
% OF TOT. CIRC.	27.77	9.80	.65	1.01	.65	5.39	5.06					
MEDIAN AGE	1967	1964	1965	1964	1965	1964	1964					
90% YEAR	1959	1952	1954	1941	1954	1945	1952					
YEAR	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %
1969	11.44	11.44	8.61	8.61	10.00	10.00	10.00	10.00	9.84	9.84	8.97	8.97
1968	26.37	37.81	13.91	22.52	20.00	30.00	20.00	30.00	11.48	21.32	10.26	19.23
1967	13.93	51.74	10.60	33.12	0.00	30.00	10.00	40.00	6.56	27.88	8.97	28.20
1966	5.97	57.71	3.31	36.43	0.00	40.00	0.00	40.00	8.20	36.08	7.69	35.89
1965	6.97	64.68	6.62	43.05	0.00	40.00	20.00	60.00	4.92	41.00	3.85	39.74
1964	4.48	69.16	7.95	51.00	10.00	50.00	10.00	70.00	8.20	49.20	14.10	53.84
1963	6.97	76.13	7.95	58.95	10.00	60.00	0.00	70.00	8.20	57.40	6.41	60.25
1962	2.49	78.62	6.62	65.57	10.00	70.00	0.00	70.00	4.92	62.32	5.14	65.39
1961	1.99	80.61	5.96	71.53	10.00	80.00	0.00	70.00	4.92	67.24	8.97	74.36
1960	5.97	86.58	3.31	74.84	0.00	80.00	0.00	70.00	4.92	72.16	2.56	76.92
1959	3.98	90.56	2.65	77.49	0.00	80.00	0.00	70.00	1.64	73.80	3.85	80.77
1958	1.00	91.56	3.31	80.80	0.00	80.00	0.00	70.00	3.28	77.08	2.56	83.33
1957	1.99	93.55	2.65	83.45	0.00	80.00	0.00	70.00	3.28	80.36	0.00	83.33
1956	1.99	95.54	1.32	84.77	0.00	80.00	0.00	70.00	1.64	82.00	2.56	85.89
1955	0.00	95.54	.66	85.43	0.00	80.00	10.00	80.00	1.64	83.64	1.28	87.17
1954	0.00	95.54	.66	86.09	0.00	80.00	10.00	90.00	1.64	85.28	1.28	88.45
1953	0.00	95.54	1.32	87.41	0.00	80.00	0.00	90.00	0.00	85.28	0.00	88.45
1952	1.00	96.54	1.32	88.73	0.00	80.00	0.00	90.00	0.00	85.28	1.28	89.73
1951	1.00	97.54	2.65	91.38	0.00	80.00	0.00	90.00	0.00	85.28	3.85	93.58
1950	0.00	97.54	.66	92.04	0.00	80.00	0.00	90.00	0.00	85.28	0.00	93.58
Before 1950	2.46	100.00	7.96	100.00	20.00	100.00	10.00	100.00	14.72	100.00	6.42	100.00

TABLE B.3, cont.
AGE OF BOOKS IN CIRCULATION --- SEATTLE PUBLIC LIBRARY AND WASHINGTON STATE LIBRARY
(continued)

SUBJECT LIBRARY	600's			700's			800's			900's		
	WASH. STATE LIBRARY/SEATTLE PUBLIC LIBRARY			WASH. STATE LIBRARY/SEATTLE PUBLIC LIBRARY			WASH. STATE LIBRARY/SEATTLE PUBLIC LIBRARY			WASH. STATE LIBRARY/SEATTLE PUBLIC LIBRARY		
	%	CUM. %	%	%	CUM. %	%	%	CUM. %	%	%	CUM. %	%
% OF TOT. CIRC.	22.64	11.26	13.68	13.33	5.52	6.16	6.67	1964	1964	1964	1964	1964
MEDIAN AGE	1964	1947	1963	1943	1935	1937	1943	1937	1943	1943	1947	1947
90% YEAR	1952		1947									
YEAR	%	CUM. %	%	%	CUM. %	%	%	CUM. %	%	%	CUM. %	%
1969	9.69	9.69	5.71	5.71	5.71	7.73	7.73	7.73	9.47	9.47	11.67	11.67
1968	10.47	20.16	11.43	17.14	18.36	10.63	18.36	12.67	8.42	17.89	12.50	24.17
1967	9.69	29.85	6.86	24.00	25.12	6.76	25.12	26.75	10.53	28.42	5.00	29.17
1966	8.53	38.38	8.57	32.57	32.37	7.25	32.37	35.20	3.16	31.58	7.50	36.67
1965	5.43	43.81	9.14	41.71	36.72	4.35	36.72	40.83	4.21	35.79	10.00	46.67
1964	6.20	50.01	7.43	49.14	43.97	7.25	43.97	43.65	4.21	40.00	2.50	49.17
1963	7.36	57.37	6.86	56.00	49.77	5.80	49.77	52.10	7.37	47.37	2.50	51.67
1962	5.04	62.41	5.14	61.14	59.41	4.83	54.60	54.92	5.26	52.63	4.17	55.84
1961	4.65	67.06	4.00	65.14	57.98	3.38	57.98	60.55	5.26	57.89	1.67	57.51
1960	6.98	74.04	4.57	69.71	61.84	3.86	61.84	61.96	1.05	58.94	5.83	63.34
1959	3.88	77.92	2.29	72.00	68.83	2.42	64.26	64.78	1.05	59.99	5.00	68.34
1958	2.71	80.63	1.14	73.14	71.73	1.45	65.71	67.60	2.11	62.10	.83	69.17
1957	1.55	82.18	1.14	74.28	75.35	5.31	71.02	70.42	3.16	65.26	2.50	71.67
1956	2.33	84.51	1.14	75.42	77.52	3.38	74.40	73.24	0.00	65.26	2.50	74.17
1955	1.94	86.45	4.57	79.99	79.69	2.42	76.82	76.06	2.11	67.37	3.33	77.50
1954	1.55	88.00	2.29	82.28	83.31	1.93	78.75	77.47	1.05	68.42	1.67	79.17
1953	1.16	89.16	2.29	84.57	84.03	1.45	80.20	77.47	3.16	71.58	.83	80.00
1952	1.55	90.71	1.71	86.28	86.20	.48	81.16	78.88	1.05	72.63	2.50	82.50
1951	1.16	91.87	.57	86.85	86.20	.48	81.16	80.29	0.00	72.63	0.00	82.50
1950	.78	92.65	.57	87.42	86.92	2.42	83.58	80.29	1.05	73.68	.83	83.33
Before 1950	7.35	100.00	12.58	100.00	100.00	16.42	100.00	100.00	26.32	100.00	16.67	100.00

TABLE B.3, cont.
AGE OF BOOKS IN CIRCULATION -- SEATTLE PUBLIC LIBRARY AND WASHINGTON STATE LIBRARY

(continued)

SUBJECT LIBRARY	BIOGRAPHY (+920-9)				FICTION				TOTAL			
	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY	WASH. STATE LIBRARY	SEATTLE PUBLIC LIBRARY
% OF TOT. CIRC.	2.63	4.70	2.83	33.12	2.83	33.12	100.00	100.00	100.00	100.00	100.00	100.00
MEDIAN AGE	1963	1965	1964	1964	1964	1964	1964	1964	1964	1964	1964	1964
90% YEAR	1928	1952	1950	1942	1950	1942	1950	1950	1950	1950	1950	1945
YEAR	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %	%	CUM. %
1969	28.00	28.00	10.81	10.81	7.14	7.14	13.31	13.31	9.63	9.63	10.40	10.40
1968	0.00	28.00	17.57	28.38	0.00	7.14	7.83	21.14	13.16	22.79	10.21	20.61
1967	4.00	32.00	8.11	36.49	7.14	14.28	6.26	27.40	9.82	32.61	7.82	28.43
1966	0.00	32.00	4.05	40.54	0.00	14.28	5.87	33.27	6.78	39.39	6.33	34.76
1965	0.00	32.00	8.11	48.65	7.14	21.42	8.81	42.08	7.17	46.56	7.17	41.93
1964	4.00	36.00	9.46	58.11	0.00	21.42	6.07	48.15	4.72	51.28	7.04	48.97
1963	16.00	52.00	5.41	63.52	0.00	21.42	4.89	53.04	6.68	57.96	5.56	54.53
1962	4.00	56.00	2.70	66.22	0.00	21.42	3.33	56.37	4.81	62.77	4.33	58.86
1961	0.00	56.00	5.41	71.63	0.00	21.42	2.74	59.11	3.93	66.70	4.39	63.25
1960	4.00	60.00	1.35	72.98	0.00	21.42	3.91	63.02	5.60	72.30	3.49	66.74
1959	4.00	64.00	4.05	77.03	0.00	21.42	2.35	65.37	3.24	75.54	2.58	69.32
1958	4.00	68.00	1.35	78.38	0.00	21.42	4.11	69.48	2.36	77.90	3.17	72.49
1957	0.00	68.00	1.35	79.73	7.14	28.56	2.54	72.02	2.36	80.26	2.71	75.20
1956	0.00	68.00	2.70	82.43	0.00	28.56	1.96	73.98	2.26	82.52	1.94	77.14
1955	4.00	72.00	0.00	82.43	14.29	42.85	2.54	76.52	1.77	84.29	2.20	79.34
1954	4.00	76.00	2.70	85.13	0.00	42.85	1.96	78.48	1.57	85.86	2.00	81.34
1953	0.00	76.00	1.35	86.48	0.00	42.85	1.76	80.24	.69	86.55	1.68	83.02
1952	0.00	76.00	4.05	90.53	7.14	49.99	1.37	81.61	1.57	88.12	1.29	84.31
1951	0.00	76.00	2.70	93.23	0.00	49.99	.78	82.39	.69	88.81	1.03	85.34
1950	4.00	80.00	1.35	94.58	7.14	57.13	1.17	83.56	.69	89.50	1.03	86.37
Before 1950	20.00	100.00	5.42	100.00	42.87	100.00	16.44	100.00	10.50	100.00	13.63	100.00

TABLE B.4
WASHINGTON STATE LIBRARY
1969 CIRCULATIONS
HOLDINGS BY YEAR vs. CIRCULATION IN 1969
SAMPLE OF 1,490 VOLUMES

1	2	3	4	5	6	7	8
Year of Pub.	Volumes in Sample	No. of 0 Cirs.	% of 0 Cirs.	Titles Circd.	Total Cirs.	Ave. Rate of Circ. 6/2	Circ. Rate 6/5
1970	(17)	--	--	--	--	--	--
1969	145	124	.8552	21	47	.3241	2.2381
1968	151	86	.5695	65	148	.9801	2.2769
1967	130	77	.5923	53	105	.8077	1.9831
1966	60	37	.6167	23	47	.7833	2.0435
1965	70	45	.6429	25	48	.6857	1.9200
1964	70	46	.6571	24	44	.6286	1.8333
1963	65	43	.6615	22	35	.5385	1.5909
1962	64	41	.6406	23	47	.7344	2.0435
1961	69	55	.7971	14	19	.2754	1.3571
1960	60	44	.7333	16	22	.3667	1.3750
1959	55	36	.6545	19	21	.3818	1.1053
1958	45	32	.7111	13	27	.6000	2.0769
1957	35	25	.7143	10	14	.4000	1.4000
1956	48	34	.7083	14	34	.7083	2.4286
1955	41	23	.5610	18	30	.7317	1.6667
1954	26	21	.8077	5	6	.2308	1.2000
1953	16	12	.7500	4	7	.4375	1.7500
1952	21	16	.7619	5	6	.2857	1.2000
1951	19	13	.6842	6	7	.3684	1.1667
1950	17	10	.5882	7	9	.5294	1.2857
1949	13	11	.8462	2	4	.3077	2.0000
1948	10	7	.7000	3	3	.3000	1.0000
1947	12	11	.9167	1	2	.1667	2.0000
1946	16	13	.8125	3	6	.3750	2.0000
1945	15	12	.8000	3	7	.4667	2.3333
1944	7	5	.7143	2	3	.4286	1.5000
1943	13	7	.5385	6	6	.4615	1.0000
1942	17	13	.7647	4	11	.6471	2.7500
1941	8	5	.6250	3	4	.5000	1.3333
1940	6	6	1.0000	0	0	.0000	--
1939	9	6	.6667	3	5	.5556	1.6667
1938	7	7	1.0000	0	0	.0000	--
1937	8	5	.6250	3	3	.3750	1.0000
1936	4	1	.2500	3	3	.7500	1.0000

TABLE B.4, cont.:
WASHINGTON STATE LIBRARY -- 1969 CIRCULATIONS, cont.:

1	2	3	4	5	6	7	8
Year of Pub.	Volumes in Sample	No. of 0 Cirs.	% of 0 Cirs.	Titles Circd.	Total Cirs.	Ave. Rate of Circ. 6/2	Circ. Rate 6/5
1935	5	4	.8000	1	1	.2000	1.0000
1934	4	4	1.0000	0	0	.0000	--
1933	4	4	1.0000	0	0	.0000	--
1932	1	1	1.0000	0	0	.0000	--
1931	2	2	1.0000	0	0	.0000	--
1930	2	2	1.0000	0	0	.0000	--
1929	12	9	.7500	3	3	.2500	1.0000
1928	2	1	.5000	1	1	.5000	1.0000
1927	9	6	.6667	3	3	.3333	1.0000
1926	7	7	1.0000	0	0	.0000	--
1925	5	5	1.0000	0	0	.0000	--
1924	1	1	1.0000	0	0	.0000	--
1923	3	3	1.0000	0	0	.0000	--
1922	3	3	1.0000	0	0	.0000	--
1921	5	5	1.0000	0	0	.0000	--
1920	3	2	.6667	1	1	.3333	1.0000
1919	3	3	1.0000	0	0	.0000	--
1918	3	3	1.0000	0	0	.0000	--
1917	1	1	1.0000	0	0	.0000	--
1916	3	3	1.0000	0	0	.0000	--
1915	3	3	1.0000	0	0	.0000	--
1914	0	--	--	--	--	--	--
1913	3	2	.6667	1	1	.3333	1.0000
1912	3	2	.6667	1	1	.3333	1.0000
1911	2	1	.5000	1	1	.5000	1.0000
1910	4	3	.7500	1	1	.2500	1.0000
1909	1	0	.0000	1	1	1.0000	1.0000
1908	3	3	1.0000	0	0	.0000	--
1907	2	2	1.0000	0	0	.0000	--
1906	4	3	.7500	1	1	.2500	1.0000
1905	0	--	--	--	--	--	--
1904	2	2	1.0000	0	0	.0000	--
1903	0	--	--	--	--	--	--
1902	0	--	--	--	--	--	--
1901	2	2	1.0000	0	0	.0000	--
1900	2	2	1.0000	0	0	.0000	--
Bef. 1900	12	6	.5000	6	7	.5833	1.1667
TOTALS:	1,490	1,029	.6641 ¹	444	802	.5684 ¹	1.7938 ¹

1. Calculated on 1960-68 data.

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TABLE B.5
WASHINGTON STATE LIBRARY
ANALYSIS OF VOLUMES WHICH CIRCULATED DURING 1969
NUMBER OF TIMES EACH TITLE CIRCULATED
(Sample of 1490 Volumes)

<u>No. of Times Circulated</u>	<u>Volumes Circulated</u>	<u>Proportion of all Volumes</u>	<u>Cumulative Distribution</u>
1	277	.6239	.6239
2	85	.1914	.8153
3	40	.0901	.9054
4	18	.0405	.9459
5	6	.0135	.9594
6	6	.0135	.9729
7	7	.0158	.9887
8	0	.0000	.9887
9	3	.0068	.9955
10	<u>2</u>	<u>.0045</u>	1.0000
TOTALS:	444	1.0000	

TABLE B.6
WASHINGTON STATE LIBRARY
1968 CIRCULATIONS
HOLDINGS BY YEAR vs. CIRCULATION IN 1968
SAMPLE OF 1,490 VOLUMES

1	2	3	4	5	6	7	8
Year of Pub.	Volumes in Sample	No. of 0 Circs.	% of 0 Circs.	Titles Circd.	Total Circs.	Ave. Rate of Circ. 6/2	Circ. Rate 6/5
1970	(17)	--	--	--	--	--	--
1969	(145)	--	--	--	--	--	--
1968	151	130	86.09	21	41	.2715	1.9524
1967	130	66	50.77	64	105	.8077	1.6406
1966	60	39	65.00	21	43	.7167	2.0476
1965	70	45	64.29	25	48	.6857	1.9200
1964	70	47	67.14	23	44	.6286	1.9130
1963	65	43	66.15	22	36	.5538	1.6364
1962	64	38	59.38	26	45	.7031	1.7308
1961	69	51	73.91	18	39	.5652	2.1667
1960	60	44	73.33	16	30	.5000	1.8750
1959	55	43	78.18	12	17	.3091	1.4167
1958	45	31	68.89	14	16	.3556	1.1429
1957	35	24	68.57	11	18	.5143	1.6364
1956	48	28	58.33	20	35	.7292	1.7500
1955	41	28	68.29	13	20	.4878	1.5385
1954	26	18	69.23	8	12	.4615	1.5000
1953	16	11	68.75	5	8	.5000	1.6000
1952	21	18	85.71	3	3	.1429	1.0000
1951	19	15	78.95	4	10	.5263	2.5000
1950	17	14	82.35	3	4	.2353	1.3333
1949	13	10	76.92	3	3	.2308	1.0000
1948	10	8	80.00	2	2	.2000	1.0000
1947	12	9	75.00	3	4	.3333	1.3333
1946	16	11	68.75	5	11	.6875	2.2000
1945	15	11	73.33	4	6	.4000	1.5000
1944	7	4	57.14	3	4	.5714	1.3333
1943	13	10	76.92	3	4	.3077	1.3333
1942	17	12	70.59	5	7	.4118	1.4000
1941	8	6	75.00	2	3	.3750	1.5000
1940	6	4	66.67	2	3	.5000	1.5000
1939	9	6	66.67	3	10	1.1111	3.3333
1938	7	5	71.43	2	3	.4286	1.5000
1937	8	6	75.00	2	6	.7500	3.0000
1936	4	4	100.00	0	0	.0000	--

TABLE B.6, cont.:
WASHINGTON STATE LIBRARY -- 1968 CIRCULATIONS, cont.:

1	2	3	4	5	6	7	8
Year of Pub.	Volumes in Sample	No. of 0 Cirs.	% of 0 Cirs.	Titles Circd.	Total Cirs.	Ave. Rate of Circ. 6/2	Circ. Rate 6/5
1935	5	4	80.00	1	1	.2000	1.0000
1934	4	3	75.00	1	1	.2500	1.0000
1933	4	4	100.00	0	0	.0000	--
1932	1	1	100.00	0	0	.0000	--
1931	2	1	50.00	1	1	.5000	1.0000
1930	2	2	100.00	0	0	.0000	--
1929	12	12	100.00	0	0	.0000	--
1928	2	1	50.00	1	1	.5000	1.0000
1927	9	5	55.55	4	5	.5555	1.2500
1926	7	6	85.71	1	1	.1429	1.0000
1925	5	4	80.00	1	2	.4000	2.0000
1924	1	1	100.00	0	0	.0000	--
1923	3	3	100.00	0	0	.0000	--
1922	3	3	100.00	0	0	.0000	--
1921	5	5	100.00	0	0	.0000	--
1920	3	3	100.00	0	0	.0000	--
1919	3	3	100.00	0	0	.0000	--
1918	3	3	100.00	0	0	.0000	--
1917	1	1	100.00	0	0	.0000	--
1916	3	3	100.00	0	0	.0000	--
1915	3	3	100.00	0	0	.0000	--
1914	0	--	--	0	0	--	--
1913	3	2	66.67	1	1	.3333	1.0000
1912	3	3	100.00	0	0	.0000	--
1911	2	2	100.00	0	0	.0000	--
1910	4	4	100.00	0	0	.0000	--
1909	1	1	100.00	0	0	.0000	--
1908	3	3	100.00	0	0	.0000	--
1907	2	2	100.00	0	0	.0000	--
1906	4	2	50.00	2	3	.7500	1.5000
1905	0	--	--	0	0	--	--
1904	2	2	100.00	0	0	.0000	--
1903	0	--	--	0	0	--	--
1902	0	--	--	0	0	--	--
1901	2	1	50.00	1	1	.5000	1.0000
1900	2	2	100.00	0	0	.0000	--
Bef. 1900	12	10	83.33	2	3	.2500	1.5000
TOTALS:	1,490	944	69.53 ¹	384	660	.5236 ¹	1.6898 ¹

1. Calculated on 1960-67 data.

TABLE B.7
WASHINGTON STATE LIBRARY
ANALYSIS OF VOLUMES WHICH CIRCULATED DURING 1968
NUMBER OF TIMES EACH TITLE CIRCULATED
(Sample of 1,490 Volumes)

No. of Times Circulated	Volumes Circulated	Proportion of all Volumes	Cumulative Distribution
1	216	.5625	.5625
2	87	.2266	.7891
3	50	.1302	.9193
4	16	.0417	.9610
5	8	.0208	.9818
6	6	.0156	.9974
7	1	.0026	1.0000
TOTALS	384	1.0000	

TABLE B.8
WASHINGTON STATE LIBRARY
CIRCULATION RATES OF VOLUMES IN YEARS 1-10 AFTER PUBLICATION
SAMPLE OF 1,490 VOLUMES

(1) Rate of Circulation for Class of Books. (2) Rate of Circulation of Those Volumes Which Circulated One or More Times.

CLASS	CATEGORY	YEAR N+1	YEAR N+2	YEAR N+3	YEAR N+4	YEAR N+5	YEAR N+6	YEAR N+7	YEAR N+8	YEAR N+9	YEAR N+10	TOTALS & AVERAGES
000's	Volumes	41	39	36	31	31	26	26	26	20	18	294
	Volumes Circ'd	5	8	4	4	4	3	3	5	2	1	39
	% Which Circ'd	12.20	20.51	11.11	12.90	12.90	11.54	11.54	19.23	10.00	5.56	13.27
	Total Circ.	14	13	7	7	7	6	5	5	2	1	67
	(1)Rate of Circ.	.3415	.3533	.1944	.2258	.2258	.2308	.1923	.1923	.1000	.0556	.2279
	(2)Rate of Circ.	2.80000	1.4444	1.6250	1.75	1.75	1.75	2.0	1.0000	1.0	1.0	1.7179
100's	Volumes	56	50	43	42	39	34	30	27	23	20	364
	Volumes Circ'd	19	11	12	10	5	8	6	4	5	7	87
	% Which Circ'd	33.93	22.00	27.91	23.81	12.82	23.53	20.00	14.81	21.74	35.00	.2390
	Total Circ.	57	42	23	20	17	16	18	7	15	23	238
	(1)Rate of Circ.	1.0179	.8400	.5349	.4762	.4359	.4706	.6000	.2593	.6522	1.1500	.6538
	(2)Rate of Circ.	3.0	.8400	1.9167	2.0	3.40	2.0	2.0	1.75	3.0	3.2857	2.7356
200's	Volumes	32	29	27	27	26	25	25	25	19	19	254
	Volumes Circ'd	9	5	6	5	7	2	5	5	2	3	49
	% Which Circ'd	28.13	17.24	22.22	18.52	26.92	8.00	20.00	20.00	10.53	15.79	.1929
	Total Circ.	27	8	10	11	8	5	11	6	3	3	92
	(1)Rate of Circ.	.8438	.2759	.3704	.4074	.3077	2000	.4400	.2400	.1579	.1579	.3622
	(2)Rate of Circ.	3.0	1.60	1.6667	2.2	1.14	2.50	2.2	1.20	1.50	1.0	1.8776
300's	Volumes	325	281	241	220	203	181	168	153	143	124	2039
	Volumes Circ'd	104	78	67	43	38	40	30	24	22	17	463
	% Which Circ'd	32.00	27.75	27.80	19.55	18.72	22.10	17.86	15.69	15.38	13.71	.2271
	Total Circ.	308	230	148	115	80	75	64	38	40	25	1123
	(1)Rate of Circ.	.9477	.8185	.6141	.5227	.3941	.4144	.3810	.2484	.2797	.2016	.5508
	(2)Rate of Circ.	2.9615	.8185	2.2090	2.6744	2.1053	1.8750	2.1333	1.5833	1.8182	1.4706	2.4255

TABLE B.8, cont.
WASHINGTON STATE LIBRARY
CIRCULATION RATES OF VOLUMES IN YEARS 1-10 AFTER PUBLICATION

CLASS	CATEGORY	YEAR N+1	YEAR N+2	YEAR N+3	YEAR N+4	YEAR N+5	YEAR N+6	YEAR N+7	YEAR N+8	YEAR N+9	YEAR N+10	TOTALS & AVERAGES
400's	Volumes	10	9	8	8	8	8	6	5	5	3	70
	Volumes Circ'd	2	3	4	1	2	3	3	0	0	0	18
	% Which Circ'd	20.00	33.33	50.00	12.50	25.00	37.50	50.00	00.00	00.00	00.00	.2571
	Total Circ.	4	3	4	1	4	5	3	0	0	0	24
	(1)Rate of Circ.	.4000	.3333	.5000	.1250	.5000	.6250	.5000	.0000	.0000	.0000	.3429
	(2)Rate of Circ.	2.0	1.0	1.0	1.0	2.0	1.6667	1.0	0	0	0	1.3333
500's	Volumes	92	83	73	65	64	60	55	53	46	42	633
	Volumes Circ'd	34	21	15	10	14	9	5	5	3	3	119
	% Which Circ'd	36.96	25.30	20.55	15.38	21.88	15.00	9.09	9.43	6.52	7.14	.1880
	Total Circ.	77	52	28	20	23	17	5	12	9	8	251
	(1)Rate of Circ.	.8370	.6265	.3836	.3077	.3594	.2833	.0727	.2264	.1957	.1905	.3965
	(2)Rate of Circ.	2.2647	2.4762	1.8667	2.0	1.6429	1.8889	1.0	2.40	3.0	2.6667	2.1092
600's	Volumes	260	235	212	204	178	165	148	134	114	104	1754
	Volumes Circ'd	94	72	59	50	37	31	26	28	19	25	441
	% Which Circ'd	36.15	30.64	27.83	24.51	20.79	18.79	17.57	20.90	16.67	24.04	.2514
	Total Circ.	217	186	156	94	47	72	50	65	30	43	960
	(1)Rate of Circ.	.8346	.7915	.7358	.4608	.2640	.4364	.3378	.4851	.2632	.4135	.5473
	(2)Rate of Circ.	2.3085	2.5833	2.6441	1.880	1.27	2.3226	1.9231	2.3214	1.5789	1.7200	2.1769
700's	Volumes	126	115	98	91	82	79	70	60	58	53	832
	Volumes Circ'd	41	38	32	34	22	18	15	8	6	5	220
	% Which Circ'd	32.54	33.04	33.67	37.36	26.83	22.78	21.43	13.33	10.34	9.43	.2644
	Total Circ.	92	72	90	57	43	29	40	28	25	17	493
	(1)Rate of Circ.	.7302	.6261	.9184	.6264	.5244	.3671	.5714	.4667	.4310	.3208	.5925
	(2)Rate of Circ.	2.2439	1.8947	2.7273	1.6765	1.9545	1.6111	2.6667	3.5000	4.1667	3.40	2.2409

TABLE B.8 cont.

WASHINGTON STATE LIBRARY

CIRCULATION RATES OF VOLUMES IN YEARS 1-10 AFTER PUBLICATION

CLASS	CATEGORY	YEAR N+1	YEAR N+2	YEAR N+3	YEAR N+4	YEAR N+5	YEAR N+6	YEAR N+7	YEAR N+8	YEAR N+9	YEAR N+10	TOTALS & AVERAGES
800's	Volumes	109	99	84	80	76	71	64	60	55	49	747
	Volumes Circ'd	25	21	11	10	12	9	6	3	8	4	109
	% Which Circ'd	22.94	21.21	13.10	12.50	15.79	12.68	9.38	5.00	14.55	8.16	.1459
	Total Circ.	54	34	18	19	17	23	16	7	15	7	210
	(1)Rate of Circ.	.4954	.3434	.2143	.2375	.2237	.3239	.2500	.1167	.2727	.1429	.2811
	(2)Rate of Circ.	2.16	1.6190	1.6364	1.90	1.4167	2.5555	2.6667	2.3333	1.8750	1.7500	1.9266
900's	Volumes	193	168	155	145	153	133	120	115	104	94	1380
	Volumes Circ'd	57	46	31	30	44	26	22	19	18	18	311
	% Which Circ'd	29.53	27.38	20.00	20.69	28.76	19.55	18.33	16.52	17.31	19.15	.2254
	Total Circ.	236	106	73	66	69	55	42	40	32	25	744
	(1)Rate of Circ.	1.2228	.6310	.4710	.4552	.4510	.4135	.3500	.3478	.3077	.2660	.5391
	(2)Rate of Circ.	4.1404	2.3043	2.3548	2.20	1.5682	2.1154	1.9091	2.1053	1.7778	1.3889	2.3923
Biog.	Volumes	72	67	64	62	59	58	54	51	48	45	580
	Volumes Circ'd	21	19	11	11	6	5	4	5	1	5	88
	% Which Circ'd	29.17	28.36	17.19	17.74	10.17	8.62	7.41	9.80	2.08	11.11	.1517
	Total Circ.	47	40	20	20	9	18	8	9	4	11	186
	(1)Rate of Circ.	.6528	.5970	.3125	.3225	.1525	.3103	.1481	.1765	.0833	.2444	.3207
	(2)Rate of Circ.	2.2381	2.1053	1.8182	1.8182	1.50	3.60	2.0	1.80	4.0	2.20	2.1136
Fiction	Volumes	32	31	30	30	30	30	30	30	30	29	302
	Volumes Circ'd	7	5	3	4	4	6	5	4	2	5	45
	% Which Circ'd	21.88	16.13	10.00	13.33	13.33	20.00	16.67	13.33	6.67	17.24	.1490
	Total Circ.	18	14	7	16	12	16	7	7	10	15	122
	(1)Rate of Circ.	.5625	.4516	.2333	.5333	.4000	.5333	.2333	.2333	.3333	.5172	.4040
	(2)Rate of Circ.	2.5714	2.80	2.3333	4.0	3.0	2.6667	1.40	1.75	5.0	3.0	2.7111
TOTALS	Volumes	1348	1206	1071	1005	949	870	796	739	665	600	9249
	Volumes Circ'd	418	327	256	212	195	160	130	110	88	93	1989
	% Which Circ'd	31.01	27.11	23.90	21.09	20.55	18.39	16.33	14.88	13.23	15.50	.2151
	Total Circ.	1151	800	584	446	336	337	269	224	185	178	.4510
	(1)Rate of Circ.	.8539	.6633	.5453	.4438	.3541	.3874	.3379	.3031	.2782	.2967	.4876
	(2)Rate of Circ.	2.7536	2.4465	2.2813	2.1038	1.7231	2.1063	2.0692	2.0364	2.1023	1.9140	2.2675

TABLE B.9
CENTRAL WASHINGTON STATE COLLEGE LIBRARY
SUBJECT ANALYSIS OF BOOK CIRCULATIONS;
January 2, 1968 - June 30, 1969

Subject Class	Titles Avail.	% of Total Titles	Titles Which Circulated	% of Titles Circulated	Circ. in Vols.	% of Total Circ.
A	917	0.97	25	0.08	47	0.06
B	6,215	6.54	2,876	9.31	8,095	10.74
C	505	0.53	182	0.59	325	0.43
D	7,728	8.13	3,010	9.75	6,834	9.07
E	3,555	3.74	1,313	4.25	2,741	3.64
F	2,905	3.06	819	2.65	1,490	1.98
G	2,519	2.68	1,096	3.55	2,770	3.68
H	12,558	13.22	5,053	16.37	14,743	19.56
J	3,134	3.30	921	2.98	1,974	2.62
K	642	0.68	98	0.32	176	0.23
L	8,278	8.71	2,765	8.96	8,574	11.38
M	3,340	3.52	632	2.05	1,362	1.81
N	3,868	4.07	1,788	5.79	4,596	6.10
P	19,413	20.44	4,576	14.82	8,741	11.60
Q	10,188	10.73	2,748	8.90	6,126	8.13
R	2,049	2.16	884	2.86	2,197	2.92
S	620	0.65	294	0.95	661	0.88
T	3,020	3.18	1,215	3.94	2,770	3.68
U	199	0.21	132	0.43	259	0.34
V	42	0.05	21	0.07	37	0.05
Z	3,274	3.43	428	1.38	847	1.12
Totals	94,969	100.00	30,876	100.00	75,365	100.02

32.51% of available titles circulated

TABLE B.10
CENTRAL WASHINGTON STATE COLLEGE LIBRARY

ANALYSIS OF TITLES WHICH CIRCULATED
January 2, 1968 - June 30, 1969

No. of Times Circulated	No. of Titles Circulated	Proportion of all Titles	Cumulative Distribution
1	14,225	.4607	.4607
2	6,871	.2225	.6832
3	3,720	.1205	.8037
4	2,140	.0693	.8730
5	1,335	.0432	.9162
6	849	.0275	.9437
7	541	.0175	.9612
8	359	.0116	.9728
9	237	.0077	.9805
10	139	.0045	.9850
11	113	.0037	.9887
12	98	.0032	.9919
13	54	.0017	.9936
14	+2	.0014	.9950
15	28	.0009	.9959
16	21	.0007	.9966
17	18	.0006	.9972
18	17	.0006	.9978
19	8	.0003	.9981
20	5	.0002	.9983
21	5	.0002	.9985
22	9	.0003	.9988
23	1	.0000	.9988
24	3	.0001	.9989
25	38	.0012	1.0001

Total 30,876

TABLE B. 11
 BELLINGHAM PUBLIC LIBRARY
 SUBJECT ANALYSIS OF BOOK CIRCULATIONS;
 January 2, 1970 - March 31, 1970

Subject Class	Titles Avail.	% of Total Titles	Titles Which Circulated	% of Titles Circulated	Circ. in Vols.	% of Total Circulation
000's	731	0.82	412	1.19	595	0.53
100's	1,373	1.55	777	2.24	2,358	2.11
200's	2,141	2.41	843	2.43	1,640	1.47
300's	7,823	8.81	3,157	9.09	7,522	6.72
400's	697	0.79	178	0.51	379	0.34
500's	4,822	5.43	1,704	4.91	4,218	3.77
600's	8,586	9.67	4,558	13.13	12,515	11.19
700's	6,899	7.77	3,401	9.79	8,833	7.89
800's	8,177	9.21	2,529	7.28	4,594	4.11
900's	19,421	21.88	5,352	15.41	12,918	11.55
Fiction	28,099	31.65	11,813	34.02	56,311	50.33
TOTALS	88,769	99.99	34,724	100.00	111,833	100.01

39.12% of available titles circulated

TABLE B.12
BELLINGHAM PUBLIC LIBRARY

ANALYSIS OF TITLES WHICH CIRCULATED BETWEEN
January 2, 1970 and March 31, 1970

No. of Times Circulated	No. of Titles Circulated	Proportion of all Titles	Cumulative Distribution
1	12,618	.3617	.3617
2	7,662	.2197	.5814
3	4,837	.1387	.7201
4	2,962	.0849	.8050
5	1,892	.0542	.8592
6	1,231	.0353	.8945
7	871	.0250	.9195
8	593	.0170	.9365
9	429	.0123	.9488
10	358	.0103	.9591
11	278	.0080	.9671
12	180	.0052	.9723
13	163	.0047	.9770
14	130	.0037	.9807
15	94	.0027	.9834
16	89	.0026	.9860
17	76	.0022	.9882
18	54	.0015	.9897
19	49	.0014	.9911
20	53	.0015	.9926
21	37	.0011	.9937
22	31	.0009	.9946
23	27	.0008	.9954
24	17	.0005	.9959
25 or more	151	.0043	1.0002
Totals	34,882		

TABLE B. 13
SEATTLE PUBLIC LIBRARY

CIRCULATION PERIODS (ACTUAL) FOR MATERIALS
SAMPLE OF 2,460 ITEMS RETURNED IN APRIL 1970

	4-Week Books	%	2-Week Books	%	2-Week Periodicals	%
No. in Sample	1,845	78.18%	363	15.38%	152	6.44%
Average Days in Circulation:						
Mean		23.87		14.31		15.23
Median		27.50		15.0		16
Mode		28.0		16.0		17
Range		1-83		1-46		1-46
Length of Circulation (Days)						
1-14	457	24.77	191	52.62	71	46.71
15-27	522	28.29	148	40.77	69	45.39
28-35	717	38.86	18	4.96	8	5.27
36-42	85	4.61	2	0.55	0	---
43-49	34	1.84	4	1.10	4	2.63
50 or more	30	1.63	0	---	0	---
TOTALS	1,845	100.00	363	100.00	252	100.00

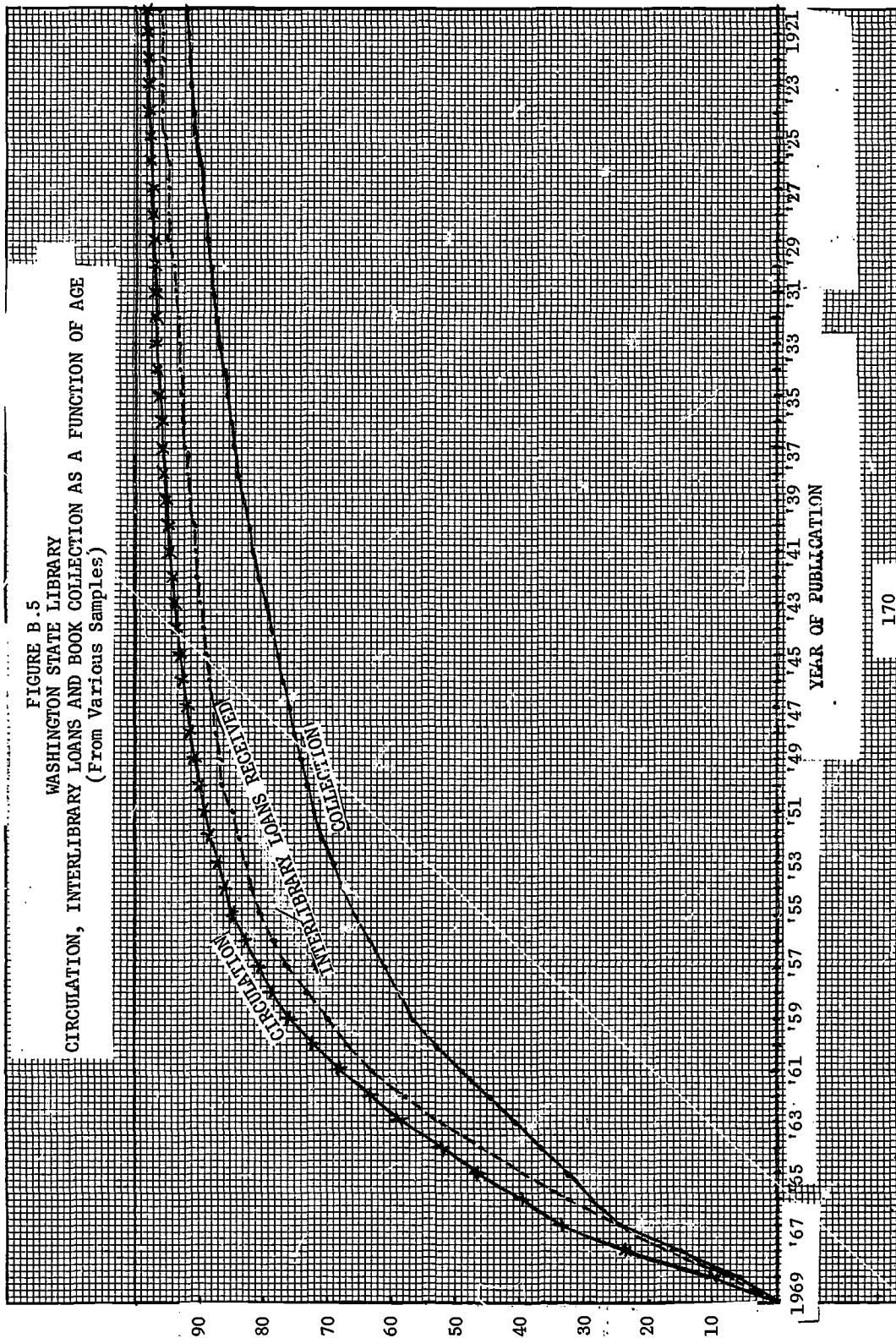
TABLE B. 14
WASHINGTON STATE LIBRARY

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CIRCULATION PERIODS (ACTUAL) FOR MATERIALS
SAMPLE OF 1,121 ITEMS RETURNED IN FEBRUARY 1970

4-Week Books		2-Week Books		Periodicals (2 weeks)		Documents (4 weeks)	
No. in Sample	%	No. in Sample	%	No. in Sample	%	No. in Sample	%
998	89.03%	25	2.23%	52	4.64%	46	4.10%
Average Days in Circulation:							
Mean		21.8		16.1		21.0	
Median		23.0		14.0		22.0	
Mode		24.5		15.0		2.0	
Range (days)		1-56		1-38		1-51	
Length of Circulation: (Days)							
1-27	52.10%	7	28.00%	26	50.00%	26	56.52%
28-35	24.65%	4	16.00%	12	23.08%	11	23.91%
36-42	8.92%	10	40.00%	5	9.62%	2	4.35%
43-49	7.31%	3	12.00%	7	13.46%	6	13.04%
50-83	4.91%	1	4.00%	2	3.85%	1	2.17%
84 and more	2.10%	0	0.00%	0	0.00%	0	0.00%
TOTAL	99.99%	25	100.00%	52	100.01%	46	99.99%

FIGURE B.5
WASHINGTON STATE LIBRARY
CIRCULATION, INTERLIBRARY LOANS AND BOOK COLLECTION AS A FUNCTION OF AGE
(From Various Samples)



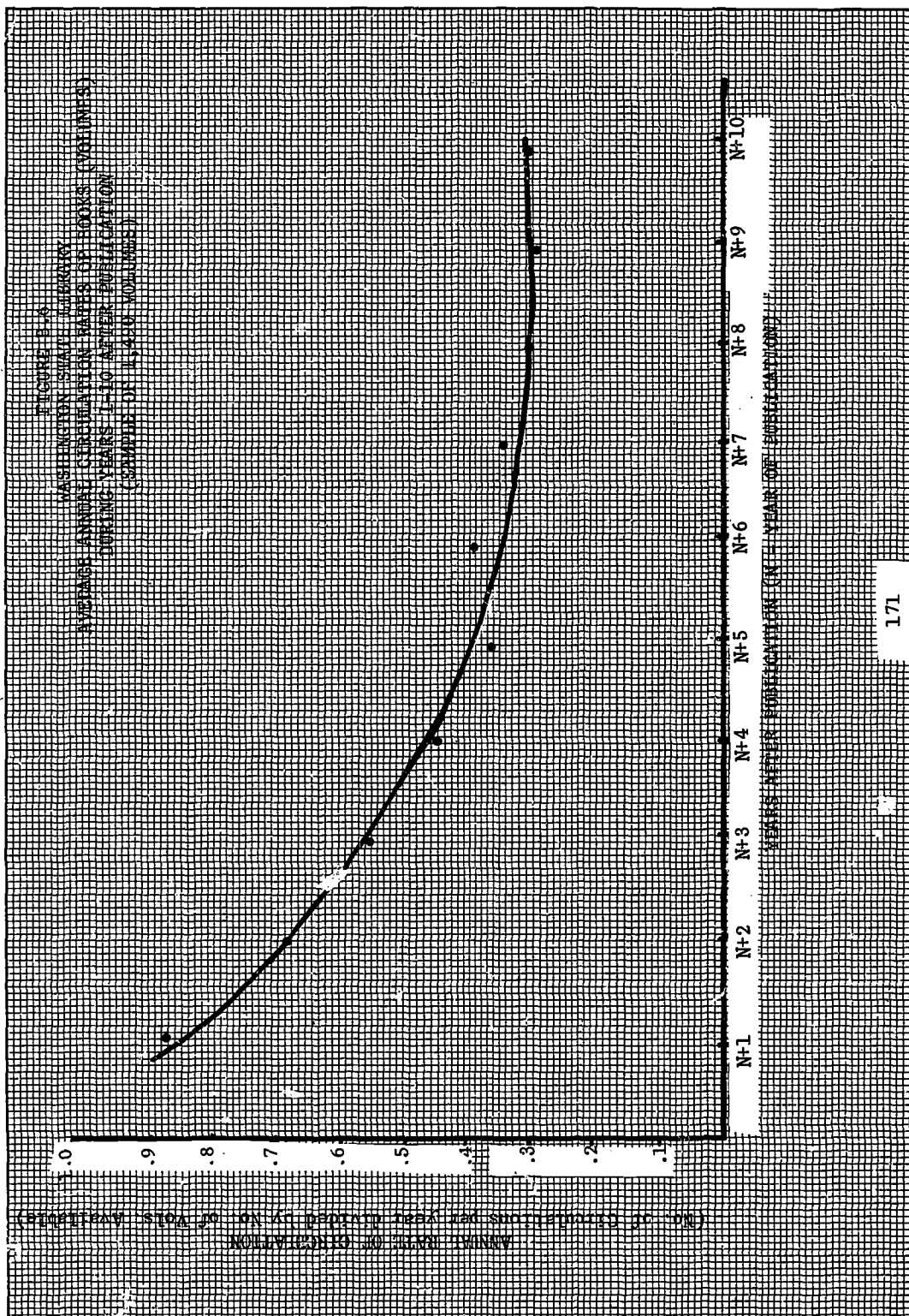


FIGURE B.7
CENTRAL WASHINGTON STATE COLLEGE
PERCENT OF COLLECTION (TITLES) CIRCULATED IN PERIOD 1/2/68-6/30/69

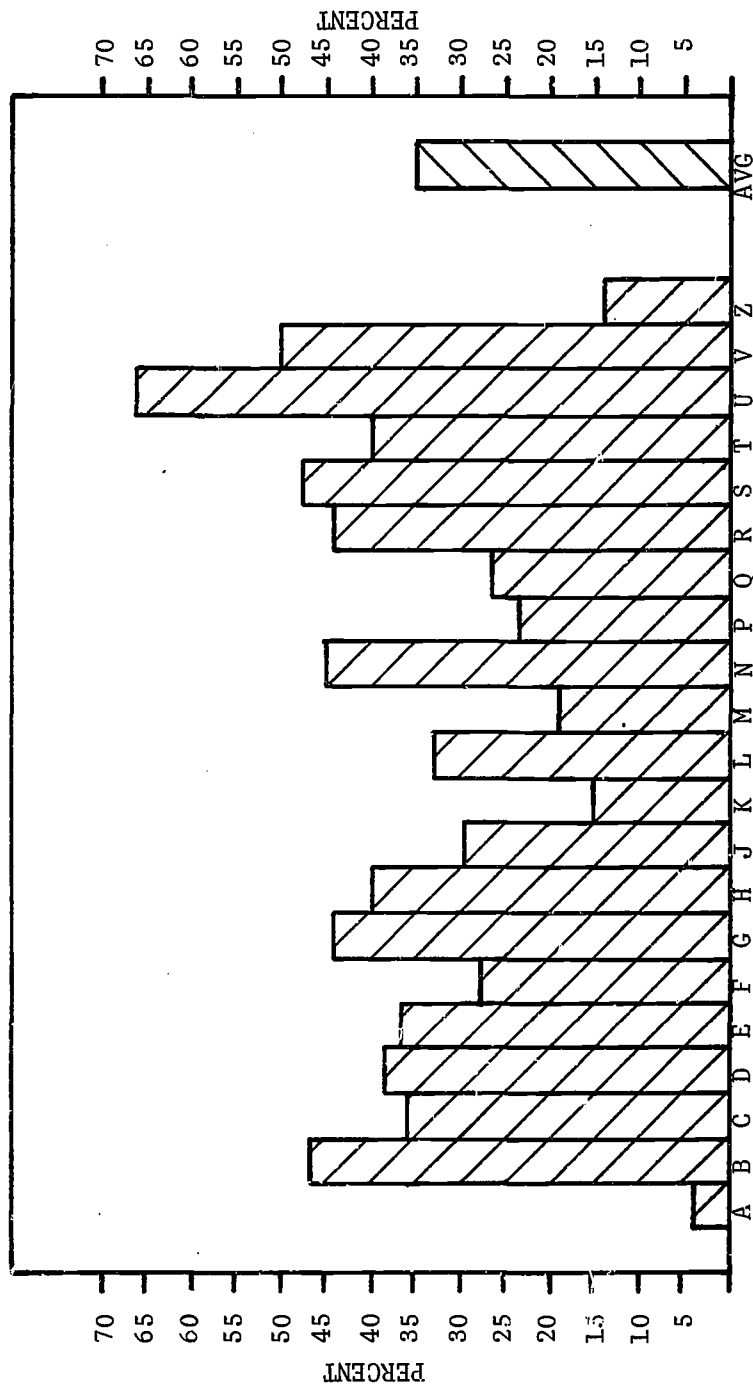
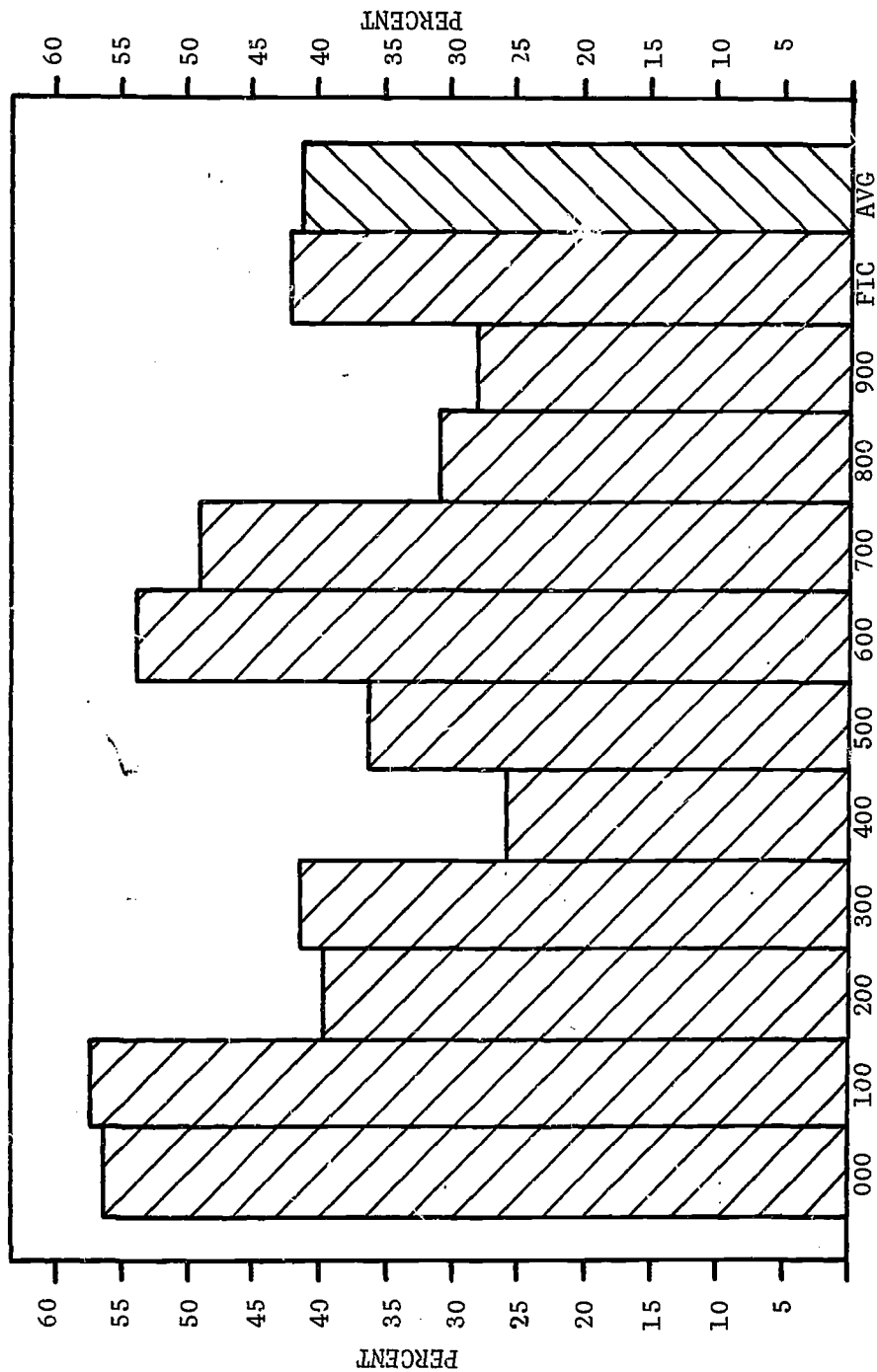


FIGURE B.8
 BELLINGHAM PUBLIC LIBRARY
 PERCENT OF COLLECTION (TITLES) CIRCULATED IN PERIOD 1/2/70-3/31/70



APPENDIX C

TECHNICAL SERVICES QUESTIONNAIRE

In order to establish a basis for comparison of alternate methods of providing technical services through networking, a survey was made of current costs of fulfilling the three technical services functions; acquisitions, cataloging, and processing (preparation). This was done by collecting pertinent data with a questionnaire sent to a sample of libraries. While satisfactory for the purposes of providing general estimates of technical services costs within alternate network configurations, data from the questionnaire is by no means sufficient to fix precise costs or to allow comparisons between libraries. Only a comprehensive technical services systems analysis--well beyond the constraints of this study--could provide definitive cost data.

C.1 Library Sample and Questionnaire

A sample of libraries was chosen to be representative of the size and type (public, academic, etc.) mix of publicly supported libraries in the state. Thirty institutions, or approximately 30% of the universe, were chosen. They consisted of twenty public libraries, five four-year colleges and universities and five community colleges. The return rates were, 11 or 55% of the public libraries, 4 or 80% of the four-year colleges and universities, and 5 or 100% of the community colleges, giving a total of 20 returns or 67%. Even in the case of public libraries with the lowest return rate, the size mix remained valid.

The questionnaire, a copy of which is presented in Exhibit C.1, consisted of four pages of questions plus a cover letter. Two kinds of information were gathered. One was data to be used in developing unit costs, number of volumes or titles handled, personnel utilized in each function and their salaries and supply and materials costs. The other was information on procedural matters; for example, tools used in cataloging, changes made in purchased cataloging data, items of equipment used, etc.

C.2 Results

Tables C.1 and C.2 present some results of analysis of the data collected. The two tables are identical except that one deals with academic libraries and the other with public libraries. Most of the columns are self explanatory but a few notes may be helpful. In all cases titles and volumes acquired in 1969, refer to the calendar year. Salary costs include a fixed percentage (11.5%) for fringe benefits for all institutions. No other overhead is included.

"% Annual Titles Backlogged" is the number of titles stated by the library as being in their "backlog" for the time periods divided by the number of titles cataloged in 1969. "L.C. Proof Slips" and "PW/BPR" indicate whether a library uses those tools as major sources of catalog data. "% Original Cataloging" means the cataloging of those items for which no cataloging data is available through the common sources, e.g. proof slips, L.C. cards, PW/BPR, Wilson cards, etc. "Titles F.T.E.", is the number of titles cataloged divided by the "Total Personnel (F.T.E.)". It can be used as an approximate measure of technical services output when comparing costs per title or per volume and has potential as a proxy for cataloging cost per title. Preliminary work indicates that correlation analysis produces a useful statement of cataloging costs for academic libraries as a function of titles per full time equivalent.

SUMMARY - - - TECHNICAL SERVICES SURVEY - - - ACADEMIC LIBRARIES

	LIBRARY TITLES	VOLUMES	ACQUISITION COSTS \$	PERS. F.T.E. LOGGING COSTS \$	PERS. F.T.E. LOGGING COSTS \$	PROCESSING COSTS \$	TOTAL COSTS \$	TOTAL PERS. F.T.E.	SALARY COSTS \$	ACQUISITION COSTS \$	CATALOGING COSTS \$	PROCESSING COSTS \$
COMMUNITY COLLEGES:												
1	1,450	1,500	2,716	.50	8,225	1.0	3,730	1.0	14,671	2.50	14,248	1.873
2	3,090	4,000	1,391	.138	14,282	.95	7,104	1.25	22,777	2.338	21,847	0.464
3	3,281	3,281	4,890	.875	6,472	.275	3,264	.725	14,626	1.875	13,676	1.490
4	4,801	5,854	19,158	3.125	27,201	3.63	8,255	1.5	54,614	8.255	53,159	3.990
5	5,045	6,545	11,531	1.5	6,054*	.10	5,231	.875	22,816	2.475	15,966**	1.200
AVERAGE	3,515	4,236	7,937	1.23	12,446	1.19	5,516	1.07	25,901	3.47	25,732	2.258
MEDIAN	3,281	4,000	4,890	.875	8,225	.95	5,231	1.0	22,777	2.475	18,048	1.873

FOUR-YEAR COLLEGES & UNIVERSITIES:

1	13,000	13,982	25,064	5.5	50,518	8.0	7,079	1.38	82,664	14.9	78,832	1.928
2	16,000	16,393	38,284	8.0	47,130	4.0	15,936	3.38	101,350	15.38	96,686	2.393
3	19,541	23,278	26,043	5.0	67,328	8.0	36,569	7.0	129,940	20.0	124,049	1.333
4	38,375	84,591	101,486	18.02	114,048	13.52	30,555	6.0	246,089	37.5	232,188	2.645
AVERAGE	21,729	34,561	47,719	9.13	69,756	8.38	22,534	4.44	140,010	21.95	132,939	2.196
MEDIAN	17,771	19,836	32,164	6.75	58,923	8.0	23,246	4.69	115,645	17.69	110,368	2.161

TABLE C.1

* This dollar figure is made of \$1.20 times the number of titles acquired since according to the questionnaire, this institution buys all titles pre-cataloged at the above per title cost.

** This dollar figure does not include salary figures for cataloging because of the above.



S U M M A R Y - - - T E C H N I C A L S E R V I C E S S U R V E Y - - - A C A D E M I C L I B R A R I E S , C o n t i n u e d :

LIBRARY	TITLES	VOLUMES	% ANNUAL TITLES BACK-LOGGED		% ORIG-INAL CATA-LOGING	L.C. PROOF SLIPS ?	PW/ BPR ?	% OF TI-TLES WITH PURCHASED CARDS		% OF TI-TLES WITH KITS	TITLES F.T.E. LIBRARY
			3-6 MOS.	>6 MOS.							
COMMUNITY COLLEGES:											
1	1,450	1,500	0.0	0.0	5.0	NO	YES	20.0	0.0	580	1
2	3,000	4,000	16.7	3.3	2.0	NO	YES	100.0	0.0	1,283	2
3	3,281	3,281	7.6	7.6	0.8	NO	YES	92.0	6.1	1,750	3
4	4,801	5,854	20.8	16.7	10.0	YES	NO	31.2	0.0	581	4
5	5,045	6,545	2.4	1.5	3.0	NO	YES	34.0	64.0	2,038	5
AVERAGE	3,515	4,236	9.5	5.8	4.2			55.4	14.02	1,012	
MEDIAN	3,281	4,000	7.6	3.3	3.0			34.0	3.05	1,283	

FOUR-YEAR COLLEGES & UNIVERSITIES:

1	13,000	13,982	1.5	1.0	15.0	YES	NO	0.0	0.0	872	1
2	16,000	16,393	20.8	3.5	9.0	NO	NO	96.0	0.0	1,040	2
3	19,541	23,278	14.3	2.7	17.6	NO	YES	48.6	0.0	977	3
4	38,375	84,591	7.8	13.0	n/r	NO	NC	21.8	0.0	1,023	4
AVERAGE	21,729	34,561	11.10	5.05	13.87			41.6	0.0	989	
MEDIAN	17,771	19,836	11.05	3.10	15.0			35.2		1,000	

SUMMARY - - - TECHNICAL SERVICES SURVEY - - - PUBLIC LIBRARIES

PUBLIC LIBRARY	TITLES	VOLUMES	ACQUI- SITION COSTS \$	PERS. F.T.E.	CATA- LOGING COSTS \$	PERS. F.T.E.	PROCESS- ING COSTS \$	TOTAL COSTS \$	TOTAL PERS. F.T.E.	SALARY COSTS \$	ACQUI- TION COSTS/ TITLE \$	CATA- LOGING COSTS/ TITLE \$	PROCESS- ING COSTS/ VOL \$
1	179	198	313	.05	1,223	.2	428	1,964	0.35	1,916	1.746	6.832	2.162
2	394	394	148	.05	531	.2	388	1,067	0.35	964	0.375	1.348	0.985
3	3,000	3,144	1,536	.38	3,510	.5	2,607	7,653	1.56	6,864	0.512	1.170	0.829
4	3,676	6,769	4,800	1.	7,490	1.	3,233	15,523	2.60	14,382	1.306	2.038	0.478
5	3,918	5,829	3,041	.4	4,013	.4	1,956	9,010	1.05	7,756	0.776	1.024	0.336
6	4,207	13,491	2,174	.5	7,567	.85	10,051	19,792	3.95	18,142	0.512	1.799	0.745
7	5,100	5,400	2,022	.3	6,534	.75	3,019	11,575	1.65	10,231	0.396	1.281	0.559
8	5,652	11,413	2,688	.5	7,809	1.2	6,966	17,463	3.35	15,647	0.476	1.382	0.610
9	6,009	21,134	19,526	2.7	16,984	2.	13,769	50,279	7.40	47,810	3.249	2.826	0.652
10	6,200	7,215	5,480	.4	15,971	2.	5,920	27,371	3.30	25,698	0.884	2.576	0.820
11	11,305	77,100	48,147	7.	57,961	6.5	25,703	131,811	22.50	124,924	4.259	5.127	0.333
AVERAGE	4,513	13,826	8,170	1.21	11,781	1.42	6,731	26,682	4.36	24,939	1.810	2.611	0.487
MEDIAN	4,207	6,769	2,688	.5	7,490	.85	3,233	15,523	3.30	14,382	0.884	2.038	0.745

TABLE C.2

M M A R Y - - - T E C H N I C A L S E R V I C E S S U R V E Y - - - P U B L I C L I B R A R I E S, C o n t i n u e d:

PUBLIC LIBRARY	TITLES	VOLUMES	% ANNUAL TITLES BACK- LOGGED 3-6 MOS.	% ANNUAL TITLES BACK- LOGGED >6 MOS.	% ORIG- INAL CATA- LOGING	L.C. PROOF SLIPS ?	PW/ BPR ?	% OF TI- TLES WITH PURCHASED CARDS	% OF TI- TLES WITH KITS	TITLES WITH F.T.E.	PUBLIC LIBRARY
1	179	198	14.0	0	10.0	NO	YES	72.0	72.0	511	1
2	394	394	0	0	50.0	NO	NO	0	0	1,125	2
3	3,000	3,144	0	0	8.0	NO	YES	24.2	0	1,923	3
4	3,676	6,769	n/r	n/r	30.0	NO	YES	0	0	1,414	4
5	3,918	5,829	1.	8.2	5.0	NO	YES	78.0	35.2	3,731	5
6	4,207	13,491	1.5	0	50.0	NO	NO	12.4	0	1,065	6
7	5,100	5,400	6.9	0	65.0	NO	NO	0	0	3,090	7
8	5,652	11,413	5.2	0	80.0	NO	YES	7.2	0	1,687	8
9	6,009	21,134	5.8	5.8	10.0	YES	YES	0	0	812	9
10	6,200	7,219	0.7	0.2	5.0	NO	YES	0	"some"	1,879	10
11	11,305	77,100	3.5	4.4	25.0	NO	YES	N/A	0	502	11
AVERAGE	4,513	13,826	3.86	1.86	30.73			19.39	10.72	1,613	
MEDIAN	4,207	6,769	3.5	0.1	25.0			7.2	---	1,414	

TABLE C.2, cont.

LOUIS BRUNO
Chairman, State Library Commission
ROBERT W. WOODS
Vice-Chairman, State Library Commission



MARYAN E. REYNOLDS
State Librarian

WASHINGTON STATE LIBRARY

Olympia

98501

March 19, 1970

EXHIBIT C.1

Dear Librarian:

As you are probably aware, the Washington State Library is presently conducting a research study to determine the development of the Washington State Library Network. This network is envisaged as encompassing many library functions such as Interlibrary Loan, Reference Service and some technical services. A major goal of the network is to provide improved service to libraries, and therefore the public, in the most economical fashion. In order to determine which is the most economical fashion, we need to know what the present costs of performing certain functions are. The attached questionnaire is designed to help us find out what these costs are for some technical services operations.

Your library has been chosen as one of a sample of libraries from which we need to collect information. The data you provide us will be used to project costs for these operations for all libraries in the state; therefore, it is very important that the information you give us is as complete as possible. The answers you provide will be used as a basis for comparison of possible alternative methods of providing centralized technical services so that a determination of which alternative will offer the most services for the least money can be made.


If your library has done any cost accounting studies of the functions covered on the questionnaire, we would appreciate your forwarding copies of the studies. We will be happy to reimburse you for any copying charges involved in getting this material to us.

The information you give will, of course, be kept strictly confidential, and your library will not be identified by name in any future publications or reports.

We have tried to make the questionnaire as straightforward as possible. If you have any questions regarding it, however, please do not hesitate to call either William Scholz or David Taylor at the State Library, (206)-753-5592, either on SCAN or collect.

In order to help us meet our deadlines, we would like to have the completed questionnaire returned to us by April 6, 1970.

Sincerely,


William Scholz
Planning and Research

WS:mr

PLEASE RETURN BY APRIL 6, 1970

EXHIBIT C.1, cont.

WASHINGTON STATE LIBRARY
TECHNICAL SERVICES

COST ACCOUNTING QUESTIONNAIRE

I. ACQUISITIONS

Definition: This function includes the placing of book orders with vendors or publishers, receiving the books ordered and paying invoices. This does not include book selection.

- A. Please give a brief description of your book acquisitions operation; for example, "Librarian decides to purchase a book, purchase request is sent to acquisitions department. Acquisitions department types multiple order form, searches catalog and on-order file to determine if library has book or has it on order. Copy of order form is sent to vendor and other copies are sent to various files (card catalog, etc.) When book is received it is properly stamped and on-order file is cleared, book is sent to cataloging department. Invoice is matched with book and approval for payment is made. Invoice is sent to business office for payment."

- B. How many book orders did you place between January and December 1969?

_____ BOOK ORDERS

- C. How many people are employed in the acquisitions function?

_____ PEOPLE

For each person, please give the number of hours worked per week in acquisitions as defined above and their salary as of December 1969.

Title	No. of Hours Per Week	Salary (Per Hour)
-------	--------------------------	----------------------

(Use additional sheets if necessary)

II. CATALOGING

Definition: This function includes the descriptive cataloging of books added to the library, subject classification and subject heading assignment. It includes cataloging done with bibliographic data of all kinds, e.g., L.C. proof slips, Publishers Weekly, National Union Catalog, etc., as well as original cataloging.

A. How many titles and how many volumes were cataloged in your library in 1969?

_____ TITLES _____ VOLUMES

B. How many people are employed in the cataloging function?

_____ PEOPLE

For each person, please give the number of hours worked per week in cataloging as defined above and their salary as of December 1969.

_____ Title	No. of Hours Per Week	Salary (Per Hour)
-------------	--------------------------	----------------------

C. Estimate the percentage of books requiring original cataloging cataloged in your library in 1969. ("Original" means no source of bibliographic data is available except the book itself.)

_____ %

D. Estimate the number of titles waiting to be cataloged at this time. How many of these have been on your shelves "uncataloged" for:

3 to 6 months _____

6 months or more _____

E. Which of the tools listed below does your library use as sources of bibliographic data in cataloging?

1. L.C. Proof-slips _____
2. Publishers' Weekly/Book Publishing Record _____
3. Cumulative Book Index _____
4. L.C. Catalogs (including Natl. Union Catalog) _____
5. Other (specify) _____

(Use additional sheets if necessary)

PLEASE RETURN BY APRIL 6, 1970

EXHIBIT C.1, cont.

Cost Accounting Questionnaire, cont.

Page 3

- F. How many titles did you buy sets of catalog cards for in 1969? (Include all types of cards, e.g., L.C., LJ, Wilson, etc.)

_____ TITLES

What was the average per set cost of those cards?

\$ _____

- G. What percentage of these sets do you change in some way?

_____ %

Please indicate those things you regularly change:

Entry _____
Call # _____
Descriptive Cataloging _____
Tracings _____
Other (Specify) _____

III. PROCESSING OF MATERIALS

Definition: This function includes the physical preparation of books necessary to place them on the shelf ready for circulation, e.g., book cards, pockets, spine labels, card reproduction, etc. It also includes book repair and the distribution of books to branches.

- A. Please indicate the types of processing done in your library and the approximate percentage of volumes receiving each kind:

1. Book cards
2. Spine labeling
3. Pockets
4. Book covers (plastic jackets, laminated)
5. Other (Specify)

- B. How many people are employed in the processing function?

_____ PEOPLE

For each person, please give the number of hours worked per week in processing as defined above and their salary as of December 1969.

Title	No. of Hours Per Week	Salary (Per Hour)
-------	--------------------------	----------------------

(Use additional sheets if necessary)

PLEASE RETURN BY APRIL 6, 1970

EXHIBIT C.1, cont.

Cost Accounting Questionnaire, cont.

Page 4

- C. How many volumes were processed by this function from January through December 1969?

_____ VOLUMES

- D. Do you buy volumes pre-processed? Yes _____; No _____

Or with kits? Yes _____; No _____

If Yes, what is the charge for this service from each of your vendors, and how many volumes did you buy from each vendor?

PRE-PROCESSED			KITS		
<u>Vendor</u>	<u>Volumes</u>	<u>Charge</u>	<u>Vendor</u>	<u>Volumes</u>	<u>Charge</u>

- E. What items of equipment do you use for book processing?

1. Electric Stylus _____
2. Laminator _____
3. Label-maker _____
4. Pocket gluer _____
5. Other (Specify) _____

- F. How do you reproduce catalog cards?

1. Hand typed _____
2. Xerox machine _____
3. Multilith _____
4. Other (Specify) _____

APPENDIX D AUTOMATION OF TECHNICAL SERVICES

This appendix complements, from a technical point of view, the detailed study of costs and flows of the main report. This role is more modest than that envisaged by the original proposal and stems from the fact that technical design must follow, not precede, a detailed study of system costs and flows. This point of view is strongly endorsed by the California State Legislature in advising the California State Library to obtain cost studies before considering further the detailed technical studies of the Institute for Library Research at Berkeley (see comments in paragraph D.1.b). Being more general, however, this appendix should be readable by librarians other than technical specialists, thus increasing the circle of those able to discuss the major design issues and hopefully leading to better decisions in the long run. The purely quantitative aspects of this appendix are contained in Sections D.2.3, D.3.6, and D.5.

Washington State Library worked with the MARC I pilot project of the Library of Congress, was involved in the planning of MARC II, and is currently providing automated catalog services to Timberland and North Central Regional Libraries. The experience of the Technical Services Division in this work will be helpful in developing the systems proposed for the network. However, the fact that these are ongoing services of the State Library does serve as a constraint, since they cannot be arbitrarily curtailed in favor of more general network development.

D.1 Approaches to Library Automation

There are many different approaches to library automation, and this section will try to give an indication of their variety, using representative examples from the literature. The reason for this variety is in part that library automation is a complex activity and does require different approaches, and in part that people of widely differing backgrounds have become interested in the field.

- a. Administration. De Gennaro¹ discusses the introduction of automated systems in an academic library from an administrative point of view. He speaks of three approaches: to wait for developments; to develop a total system in one go; and to adopt an evolutionary approach. Building the capability for automation is also discussed.
- b. Cost/Benefit. Arthur Young and Company² define the scope of a cost/benefit study for the California State Library. The first few pages of this report are of great value in pointing out that from a legislative point of view, whether or not to proceed with a system for a public body depends not primarily upon the technical means but upon the gross costs and benefits projected for the system in comparison

with current values of these costs and benefits.

- c. Business Systems Analysis. As Chapman and St. Pierre³ point out, systems analysis does not necessarily imply automation, (although automation will almost always benefit from systems analysis). They describe five major steps: analysis and understanding of current procedures; determination of the requirements of the system; determination of the inputs; evaluation of current procedures to see if they satisfy requirements; and design of a new system or modification of the old. The kind of system being analyzed is typically one based on extensive paperwork and with a number of different work stations such as found in banks, insurance companies, or libraries.
- d. Technical Design. The Institute of Library Research at Berkeley has carried out detailed technical studies for a proposed California State Library Processing Center.⁴ These reports consider a wide variety of technical issues in great detail, including: production and control, conversion, file maintenance, authority verification, book catalog filing, book catalog format, processing center organization, coding manual, and serials control. Much of this is in sufficient detail to provide excellent reference for the Washington State network when the planning for the latter reaches a comparable level of detail.
- e. Subroutines. Alanen⁵ discusses certain unique requirements of bibliographic data processing and suggests that the best way to meet these is by the construction of a set of subroutines for this purpose. These would include subsets for input/output, for identification and location of data, and for processing. Thus, original programming would be simplified.
- f. Existing Programming Languages. Burgess⁶ discusses a number of existing high level languages (Fortran, Cobol, PL/I, Snobol) in terms of their suitability for programming information storage and retrieval systems. The requirements are very similar to those of library automation. Burgess lists a number of desirable language properties and assesses each language against these. He also points out that the hardware and operating system environment can considerably affect the use of a particular language, either favorably or unfavorably.
- g. New Programming Languages. Dolby and Resnikoff⁷ discuss the requirements on a new high level programming language designed specifically for bibliographic data processing. They point out the important fact that the operations performed by Fortran and Cobol were thoroughly understood and agreed upon

long before the languages were devised. In the field of bibliographic data processing, however, there is little agreement, and considerable ignorance in fact, as to what the basic operations are. Language construction in such a case is understandably difficult.

As can be seen, the approaches mentioned above have been listed in increasing level of detail or technical specificity. The present study lies towards the top of the list, bridging (a)-(d) with perhaps most emphasis on (b). This is the main reason for this appendix having the general character that it does.

The current automation activities of the Washington State Library are fairly small-scale ones aimed at providing cataloging services and book catalogs to a small number of client regional libraries. Development has been evolutionary, dating from the initial involvement in the MARC I project of the Library of Congress. It is not clear yet whether this evolution can continue into the proposed network system or whether there will be a discrete break and something of a new beginning.

Three of the major nationally known systems of interest to the current study for the purposes of comparison and contrast are the Ohio College Library Center (OCLC), the bibliographic automation project at Stanford Libraries (BALLOTS), and the New England Library Information Network (NELINET). Their major emphasis as a group is in approach (d) above, technical design and implementation. The present study emphasizes quantitative modeling and cost/benefit considerations to a much greater extent. Consequently, when technical details are refined at a later date they will be based upon a prior comprehensive knowledge of flows and costs.

D.2 System Environment

This section considers some of the factors which exercise a determining influence upon the technical system and within which the design must take place. The discussion is divided into four parts: objectives; constraints; quantitative parameters; and hardware/software environment.

D.2.1 Objectives

The technical system being discussed in this appendix is a computer/communication system together with operating procedures, designed to support the overall objectives of the network. These objectives can be split into long and short range. The former tends to be vague, and so this section is mainly concerned with technical system objectives governing the next three years or less.

Discussion is limited to only one example of a limited class of technical systems and assumes that the State Library will design, implement and operate some form of centralized computer system. However, there are an almost endless variety of alternative systems which might be considered, for example:

- a. Centralize cataloging, but perform it manually. Chapter 3 indicates that this alone would provide substantial savings.
- b. Automate in the direction proposed below, but do so on a regional basis.
- c. Buy cataloging data "wholesale" from national sources, public or private, and "retail" it to local libraries.
- d. Contract all technical services out to specialist commercial organizations with the State Library only concerned with the specifications for these services, whether or not they are performed adequately, and their cost.

A consideration of alternatives such as these must be made when the data of the present report have been digested and in some cases followed up in more detail. However, for the moment, a reasonable middle-of-the-road system has been selected for discussion in this appendix, as an example of a general approach to system design.

As the main report has shown, the network is concerned with a variety of types of library (public, university, college, community college, and state) as well as a variety of functions (interlibrary loan, technical services, and collection management). A wide range of technical and organizational systems can be proposed to support network services at various levels of sophistication and cost. A conservative system is proposed below. Two general guidelines are: it is preferable to have to upgrade a conservative system rather than to cut back an advanced one; and secondly, those things should be attempted which are needed for future developments rather than those which are final products in themselves. The following objectives are therefore proposed:

- a. Build a cumulative state-wide bibliographic and holdings data bank. Provide catalog products on demand (catalog cards, book cards, spine labels). The data bank should include data derived from MARC tapes as well as from original cataloging.
- b. Produce current acquisition lists for member libraries on a regular basis.
- c. Produce statistical reports on acquisitions data on a regular basis.
- d. Construct a book catalog for the Washington State Library collection.
- e. Continue any current commitments which cannot be met by above or dropped.

It should be noted that, apart from (d), there is no provision for retrospective cataloging. Decisions on this should await a consideration of the findings of the RECON project. Also, no provision is made

for catalogs at the local or regional level. Book catalogs are quite expensive, and they come in an almost endless variety. Choices must be made as to what purpose they will serve, e.g., bibliographic reference or finding list, what frequency of production and cumulation, what information to include for each entry, what access points to provide, and what scope of contents, e.g., by individual library or by region. These choices should not be made arbitrarily, and so it seems better to delay book catalog production until some of these questions have been studied more carefully in relation to the objectives of the network as it serves the state of Washington.

On the positive side, (a) serves the technical services function of the network through centralized cataloging and catalog products as well as laying the groundwork for future machine-based catalog services. Items (b) and (c) serve the collection management function of the network, and item (d) the interlibrary loan function, since a large proportion of all such loans are made by the State Library. In addition, (d) gives practice in constructing a complete machine-based catalog for a collection and will permit the important printed catalog/microform catalog issue to be explored.

In relation to existing State Library computer activities, the starting of the network system proper is a watershed in respect of files, formats, documentation, standards, etc. It is the first step towards an integrated system, permanently machine-based. The question of whether or not existing programs and procedures are adequate for, or can be adapted to, this task must be considered. To have to redo substantial portions of the system, either programming or data conversion, in a few years would be most unfortunate.

D.2.2 Constraints

Some of the most obvious constraints are mentioned below.

- a. Existing operational commitments. Washington State Library already provides book catalog services to two regional public libraries (Timberland and North Central). These cannot be discontinued arbitrarily, and so the question of how they fit into the proposed system development must be considered.
- b. Costs. Chapter 3 of the main report has indicated some of the savings that would accrue to individual libraries, if all cataloging were to be centralized. These savings are shown in Table D.1 by type of library and amount to a state-wide total of almost \$700,000 annually. However, these figures are deceptive since there is virtually no way in which these savings can be collected and made available to the processing center. Charging for some services would help, but in the initial stages this may discourage use unduly. It seems more likely, therefore, that the processing center will be an additional

budget item for the State Library, whether supported by state or federal funds. Estimates of what the proposed system might cost are given in Section D.5. To give a sense of perspective, technical services costs average about 10% of total library operations budgets.

- c. Personnel. The Technical Services Division at the State Library does not have an adequate technically qualified staff for the proposed system, although additions are currently being made. At the moment the division's technical strength consists of the chief, Mrs. Josephine Pulsifer, who also has a great deal of outside responsibility, a computer systems analyst, and contract programmer and analyst time from the state Data Processing Service Center. In fact, it is remarkable that the division has done as well as it has up till now with such limited resources. For the future, however, the division must have adequate support, with the addition of a number of technically qualified people to the staff, one of whom should be at the level of deputy chief for machine-based systems. None of these need be librarians.
- d. Facilities. The Technical Services Division occupies space in the State Library building. While adequate for current activities, more space will probably be required as the proposed system develops.

Computer facilities are provided by the State Data Processing Service Center. This represents a possible constraint but one which should not be too severe (see Section D.2.4). The fairly modest system proposed at first should run adequately at the Data Processing Service Center. Legally, the State Library may, with due cause, obtain either outside commercial computer services or even its own computer. However, it does not seem that either course will be necessary in the immediate future.

D.2.3 Quantitative Parameters

It is both possible and desirable to estimate and project some of the loads on the proposed system, for example, file size and access/processing frequency for various functions. Costs will be dealt with in Section D.5. Basic data is shown in Table D.2 and computed data in Table D.3. Figures have been rounded slightly in some cases, and the data is for 1969 and all types of library taken together (public, university, college, community college and state), except where stated. Table D.4 shows a breakdown of volume and titles by type of library so that there is some feeling of how the calculations of Section D.5 could be repeated for individual types of library, although the state-wide unique title figures would need to be revised.

TABLE D.1
STATE-WIDE COST OF TECHNICAL SERVICES
(Data from Chapter 3)

TYPE OF LIBRARY	C O S T S		
	CURRENT	CENTRALIZED	SAVINGS
Public	\$1,024,586	\$ 689,102	\$355,484
University	315,743	205,858	109,885
College	213,389	129,899	83,490
Community College	332,603	204,212	128,391
State	57,496	35,428	22,068
TOTAL	\$1,943,817	\$1,264,499	\$679,318

NOTE: These are costs for a state-wide system embracing all types of library. The costs of a state-wide system embracing only one type of library, e.g., public, are different from those shown above.

TABLE D.2
QUANTITATIVE PARAMETERS -- BASIC DATA

Total volumes acquired	750,000/yr	1969 data
Total locally unique titles acquired .	300,000/yr	study data
Total state-wide unique titles acquired	75,000/yr	study data
Total state-wide unique titles	1,100,000	study data
Total <u>State Library</u> titles	150,000	1969 data
MARC tapes	1,200 titles/wk	
% new titles found on MARC	60%	estimated
Mean time to acquire books	6 weeks . .	estimated
Time limit after which original cataloging is sought for title . . .	8 weeks . .	suggested
Bibliographic record; e.g., holdings, in process, MARC	500 characters/estimated	
Query record (request for catalog data and products)	50 characters/estimated	
Receipt card record	50 characters/estimated	

TABLE D.3
QUANTITATIVE PARAMETERS -- COMPUTED DATA

Union catalog (hypothetical)	$.5.5 \times 10^8$	characters
Cumulative holdings file		
75,000 x 500 = 37.5×10^6	$.37.5 \times 10^6$	characters/yr
Cumulative MARC file		
1,200 x 50 x 500 = 30×10^6	$.30 \times 10^6$	characters/yr
In process file (steady state)		
# records at one time x record length		
(300,000 x 6/50) x 500 = 18×10^6 . . .	$.18 \times 10^6$	characters
Query file (steady state)		
# records at one time x record length		
(300,000 x 8/50) x 50 = 2.4×10^6 . . .	$.2.4 \times 10^6$	characters
MARC titles		
60% x 75,00045,000/yr	
Original cataloging		
40% x 75,00030,000/yr	
State Library Catalog		
150,000 x 500 = 7.5×10^7	$.7.5 \times 10^7$	characters

NOTE: A year of 50 weeks has been used for convenience.

TABLE D.4
TITLES AND VOLUMES BY TYPE OF LIBRARY
(Data is state-wide for 1969 from Chapter 3)

TYPE OF LIBRARY	VOLUMES	LOCALLY UNIQUE TITLES	CONTRIBUTIONS TO STATE-WIDE UNIQUE TITLES
Public	474,878	147,938	36,096
University	122,397	48,461	11,824
College	48,817	36,820	8,984
Community College	82,534	56,618	13,815
State	14,727	9,732	2,375
TOTAL	743,353	299,569	73,094

D.2.4 Hardware/software Environment

It is most likely that the proposed system will be implemented at the State Data Processing Service Center, as explained in paragraph D.2.2d. The Service Center exists to provide data processing services to those state agencies who may need them. It is not the only computer system in state government. Various departments, e.g., Department of Motor Vehicles and Department of Institutions, have their own systems.

At the moment the hardware of the Service Center consists of two systems, IBM System/360 Models 30 and 50.

The Model 30 system is primarily used for running older programs, e.g., written for the IBM 1401, through emulation, rather than new programs written expressly for the System/360.

The Model 50 system is the major system of the Service Center. It has 512K bytes of core memory in four partitions and runs under 360/OS MFT II. The peripherals include one card reader/punch, two line printers, eight 9-channel tape units, twenty-one modules of 2314 removable disc storage and numerous remote terminals, both video as well as type-writer or teletype. The use of remote processing has risen rapidly, due to recent requirements for continuous on-line access, e.g., by the State Patrol. A second Model 50 central processor is on order and the two will then be used to split the workload, one primarily for batch processing, and one primarily for on-line.

Major languages available are 360 Basic Assembly Language (BAL), Fortran, Cobol and PL/1. The use of the last named is not encouraged on the grounds that the compilers are not yet entirely reliable.

D.3 System Design

This section considers some features of system design in general terms. The system is expected to work in the following way. Individual libraries order and receive books as they do now. At the time of ordering, a copy of the order form is sent to the State Library, and this constitutes a request for catalog data and products (catalog cards, book cards, spine labels) for the book. These products are derived from machine-based bibliographic data files if available in a weekly batch processing cycle. If not, after an eight-week period, the book is cataloged originally and pertinent data entered into the machine files. When the book is received by the local library, notice is sent to the State Library for the holding file. The machine-based bibliographic files are derived from MARC tapes and original cataloging. This differs somewhat from what is proposed by the State Library, but the differences are slight. They are mainly that the State Library does not intend to use receipt cards and will only do brief original cataloging for titles expected later through MARC.

The discussion is divided into six parts: files; record formats; basic processing functions; data quality control; statistics; and notation.

D.3.1 Files

The machine-based information that is at the heart of the proposed system will be stored in various files. Questions to be asked include: what files are needed, how large will they be, what storage medium should be used, etc. This section considers some of these questions briefly.

The main files are MARC cumulative (30×10^6 characters/yr), holdings cumulative (37.5×10^6 characters/yr), in-process (18×10^6 characters steady state), and query (2.4×10^6 characters steady state). There may also be an authority file (of unknown size) for maintaining control of subject headings, a library file (small) with data on each member library, and a file containing records for statistical purposes.

A major question is how the first three files should be organized as a group. Essentially, once a week a new MARC tape will be added to the MARC file, the new queries added to the query file, and then the query file passed against some combination of the first three files. Depending on the probabilities (completely unknown) of finding the query catalog data on each of these three files, they should be searched in a specific order in order to minimize mean search time. Operating data should quickly lead to statistics to optimize this choice.

Another question is whether or not to remove from the cumulative MARC file those records also found on the holdings file. Using the 60% hit rate, this would amount to 22.5×10^6 characters/year to be removed from the MARC cumulative file, reducing it from 30×10^6 to 7.5×10^6 characters/year. Since this is at the cost of the integrity of the MARC file as a comprehensive cumulation of Library of Congress output, this issue may be decided either way.

How the files are organized internally is another question, that is, in sequential or random order, with or without associated index or directory files. Not all records will have an LC card number, so this cannot be used as a universal record identifier. The Institute of Library Research, in their study for the California State Library, advocates keeping the lengthy bibliographic records in one file, assigning sequential identification numbers as they are added in, and short index records (both author and title) sorted in another. As an approach, this is attractive. Decisions on this must await more detailed design.

How should these files be stored? The main choice is threefold; magnetic tape, off-line disc or on-line disc. Costs are compared in section D.5. Off-line disc is probably the best compromise, offering more flexible processing at low cost. The removable disc packs of the

IBM 2314 Disc Storage System are of particular advantage here. On-line disc storage is not needed until on-line remote processing is required.

D.3.2 Record Formats

The format of a record is the way in which the data of the record is organized. Up till the MARC I project in 1966, there was virtually no agreement on record formats for bibliographic data. This meant that machine-based information prepared at one installation could not be utilized at another. The Library of Congress now sends out weekly tapes in MARC II format (a revised successor to the pilot MARC I). This format is fast becoming a standard or at least the basis for one.

However, the MARC II format is a communications format. That is, it governs the format of data so that the data can be communicated between two installations. It is not a processing format or a storage format and has nothing to do with how a local installation processes or stores the data. This means that formats for processing and storage need to be selected. They need only be compatible with MARC II, not MARC II itself.

The MARC II format defines a record as consisting of a continuous sequence of characters, organized into five groups. The first is a fixed length leader which contains information about the record, how long it is, what type, e.g., monograph, etc. The second is the directory to each of the fields following. The third is a control number field of variable length, in fact, containing the LC card number. The fourth is a group of fields of fixed length. The fifth and last is the group of fields of variable length, some with subfields.

The format is defined in structural terms, and the actual data need not be bibliographic. Since programs that process these records do so largely on the basis of their format or structure rather than their content, there is an advantage in having as much of the system data in a compatible format as possible. This means, for example, storing the query records in MARC II format, as well as the authority file and local library data in similar fashion. Then programs written to process MARC II bibliographic records will also process these other ones too.

But, as was said above, the MARC II format is a communications format and it is necessary to select additional formats for processing and storage. The suggestion is therefore made that as far as possible, the variety of formats should be restricted and that common formats be chosen for processing and storage for as many files as possible. These would be easily compatible with MARC II and might be called Washington State Processing formats, or WASP formats for short! To do this will lead to economy in program and file design as well as restricting conceptual detail from needless intricacy.

D.3.3 Basic Processing Functions

A variety of basic processing functions are required to support the proposed system. If the suggestion of a common record format is followed, then one program will be able to perform the same operation on different files, with corresponding economy.

- a. Single file operations. General purpose operations are required such as file creation, editing, updating, sorting, listing and searching. Updating includes the addition of records to the file or deletion of records from it. The programs which implement these functions will assume WASP record format.
- b. Multi-file operations. General purpose operations are required such as merging two or more files, and matching two files for common records or records containing common values of a particular field. In the latter case, the original two files (say A and B) are split into three files, a file of common records, the residual A file, and the residual B file.
- c. Special purpose operations. A number of special purpose operations are required:
 - format conversion from MARC II to WASP and vice versa.
 - preparation of MARC II or WASP format records -- original cataloging input.
 - production of catalog products from bibliographic data files.
 - special format for printed output, either line printer, photocomposition or microform.
 - statistical operations not available in packaged programs.

D.3.4 Data quality control

The proposed system will build large permanent machine-based data files. If there is no planned quality control of these files, the data in them will not be completely reliable. The significance of this varies. For data that is not used for access, such as the imprint, errors are a nuisance but not really serious. For data that is used for access, such as LC card number, errors are extremely serious. Records dependent upon erroneous data may be essentially lost to the system. There are four major ways in which data quality can degrade.

In the first case, erroneous data is entered into the system on

input. This can be avoided, or at least minimized, by rigorous proof-reading and verification before final data entry with edit and correction cycle continuing as long as necessary.

In the second case, data degrades through errors of primarily machine origin. These can occur at different levels and are dealt with at different levels. Single bit errors occurring between memory and secondary storage may be detected by hardware parity checks. Errors in single characters or groups of characters may be detected by check sum calculations performed on record transfer by system software. Similar errors may also be detected by applications software, i.e., user programs, through such schemes as check digits.

In the third case, malfunctioning of system software in a multi-programming environment can lead to random quantities of disc-stored data being destroyed, sometimes undetectably. If this error is not suspected at the time it occurs, then virtually no recovery is possible.

In the fourth case, a hardware malfunction causes the destruction of data at a known time. This can be protected against by maintaining a set of back-up tapes of the data, say one day old, one week old, one month old, and so on. Of course, the longer ago the error occurred, the greater the effort to correct it.

Errors cannot be prevented, but they and their effects can be minimized.

D.3.5 Statistics

No large enterprise today can afford not to gather management information from its operating data. One of the major tasks of the present study has been to piece together data on various aspects of library operations in Washington state and show how management conclusions can be drawn. Most of this data has been obtained from ad hoc sampling and surveys. What is needed is a system of ongoing data collection, together with procedures for deriving useful management information from such data. If part of the proposed processing system is to be machine based, then the computer should also be responsible for generating useful statistics regarding the data passing through it. Since much network activity, e.g., interlibrary loan and circulation, will take place outside of the machine (at least at first), data on these operations must be sought separately.

The data under computer control in the initial system are the current acquisitions of the member libraries. Much useful management information can be obtained from these. Data on the overlap between the acquisitions of different libraries can be obtained broken down by subject matter and year of material and by size and type of library. Distribution of material by subject matter, by year, and size and type of library can be obtained. This information can be consolidated into

regional figures if required. The load upon the processing center by time of year can be learned together with information upon which machine-based files are most likely to supply requested catalog data. The cost of obtaining this information in useful form should be slight since the records upon which it is based all exist in machine readable form. What is required is that provision for this should be designed into the machine system from the onset.

D.3.6 Notation

The design of any large system requires a precise descriptive notation. Such a notation serves as a communication bridge between the various people concerned with the design. The designer must communicate in two directions, with the technical specialist who will build the system and with the lay colleague who is concerned that the technical system furthers the objectives of the overall system of which it is a part. In the present case, flow charts are an excellent notation when the designer is talking to programmers, but not so good when he is talking to librarians. For this, a more general notation is useful, such as the block diagram. An example is given in Figure D.1.

Data at the processing center are stored in various files or sets:

- M MARC (cumulative)
- H Holdings (cumulative)
- Q Query (steady state)
- P In-process (steady state)

The main products are:

- CP Catalog products
- R Receipt cards for libraries to
return upon receipt of books
from vendors

Increments to these files are indicated by the symbol Δ , e.g., ΔM is the weekly MARC incremental tape. δQ is that part of the query file sent to original cataloging after 8 weeks' waiting. Files which are modified by the processing are shown as F' . The logical relationships AND, OR and NOT are shown by \cap , \cup and $-$ respectively. The symbols $+$ and $-$ are used in the sense of adding and subtracting elements from sets. The operations of summation (or merging) and matching sets are indicated by Σ and X respectively. Original cataloging is shown by OC, and sorting by S.

Using these symbols, a particular version of the flow of data through the processing center can be shown in Figure D.1. In addition, the diagram shown in Figure D.1 can be represented entirely symbolically as follows:

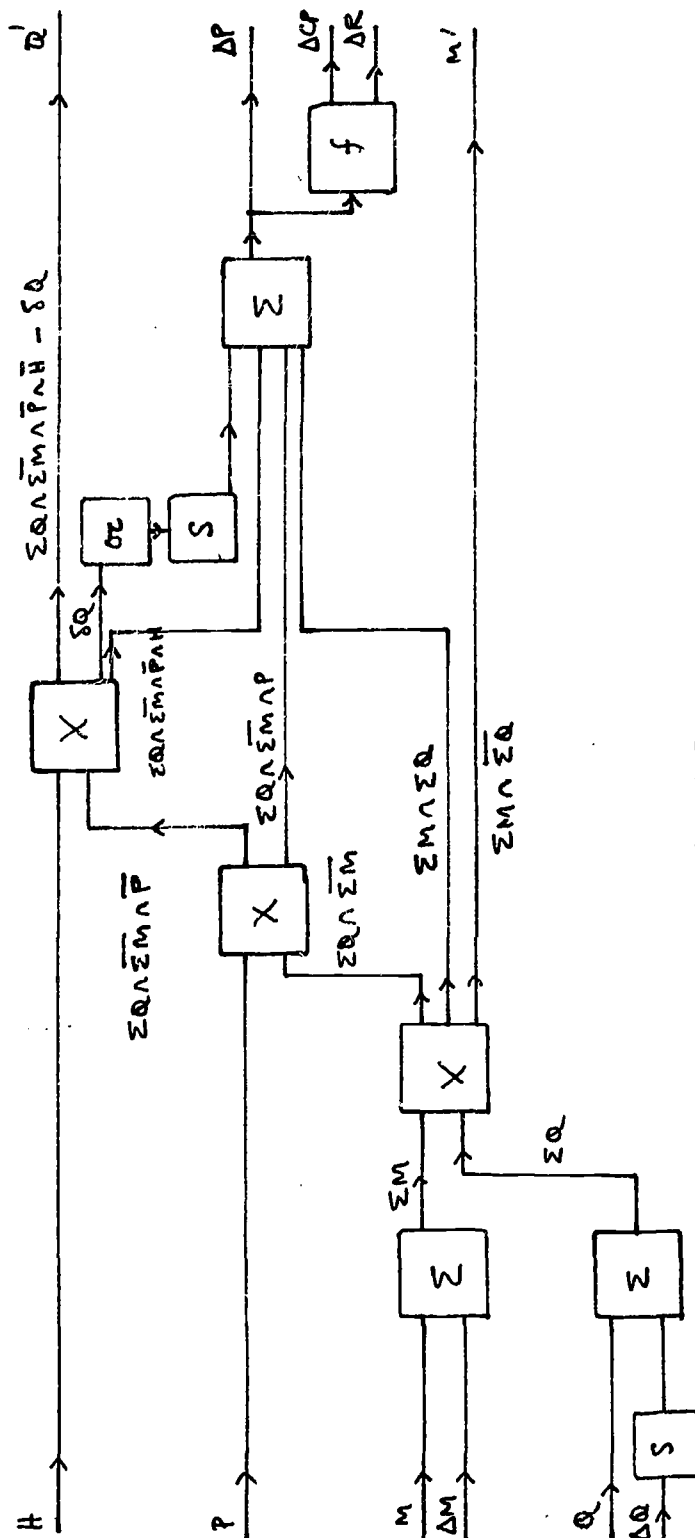


FIGURE D.1: SYSTEM BLOCK DIAGRAM

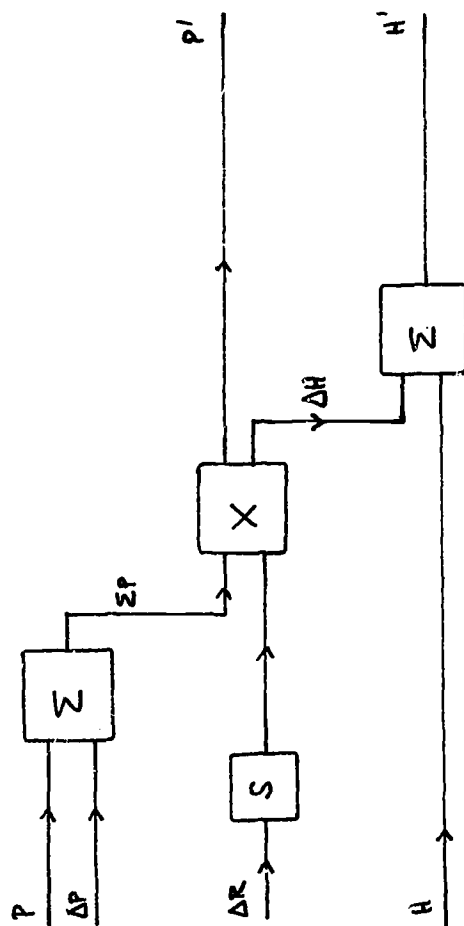


FIGURE D.1: SYSTEM BLOCK DIAGRAM (continued)

$$\Sigma M = M + \Delta M$$

$$\Sigma Q = Q + \Delta Q$$

$$M' = \Sigma M \cap \overline{\Sigma Q}$$

$$Q' = \Sigma Q \cap \overline{\Sigma M} \cap \overline{P} \cap \overline{H} - \delta Q$$

$$\Delta P = \Sigma Q \cap \Sigma M + \Sigma Q \cap \overline{\Sigma M} \cap P$$

$$\Delta CP = f\{\Delta P\}$$

$$\Delta R = f\{\Delta P\}$$

$$\Delta H = \Sigma P \cap \Sigma R$$

$$P' = \Sigma P - \Delta H$$

$$H' = H + \Delta H$$

Although not absolutely accurate, this example of notation shows how a system can be represented by either graphic or symbolic means. At this level of detail, alternatives can be discussed with the wider library community and final design decisions made. From such a notation the transition to flow charts for programmers is much easier than if narrative text only has been used to describe the proposed design. In addition, a block diagram such as Figure D.1 can be the basis for cost estimates as carried out in section D.5.

D.4 System Implementation

This section discusses some aspects of system implementation under the headings: Programming; Documentation; and Schedule.

D.4.1 Programming

Eventually the proposed system is to be implemented on an existing computer system in an available programming language. In the present case there is not much freedom of choice in the matter of computer system which will probably be at the state Data Processing Service Center. However, there is a choice when it comes to programming language.

The choice is between the Basic Assembly language (BAL) for the System/360, and a high level language such as Fortran, Cobol or PL/1. Although both Fortran and Cobol could be used, they are not as suitable as PL/1 to the task of processing variable length tagged records which is what the data is largely like. For this reason, it is simpler to debate the issues between BAL and PL/1.

Greater efficiency at run time is the main advantage of BAL, and clearly will be decisive if run time costs are large and dominate the overall costs. Assembly time for BAL programs is less than compile time for PL/1, but this is unlikely to be a decisive matter.

PL/1 has the advantage of producing shorter and more clearly understandable source programs in a shorter time than BAL. Thus program development and subsequent modification are much easier. Since the system will eventually come to comprise some very large programs, the increased conceptual grasp of the system provided by PL/1 source programs is an advantage.

When consideration is given to moving the entire system to future computers, PL/1 has the slight edge. While BAL will probably be emulated on future IBM machines, PL/1 is more likely to become available on other manufacturers' equipment.

The basic issue is still run time speed for BAL versus development speed and easier conceptual understanding for PL/1. The State Library is approaching a processing system of the scope proposed for the first time and so it is likely that there will be need to modify the programs in the light of experience. The flexibility to modify programs that such a situation makes desirable would seem to make PL/1 the first choice.

These remarks are simply a rehearsal of the well-known trade-off in using either an assembly or a high level language. Their applicability to the case in hand must be considered in the light of any special requirements of the programs themselves. In addition, there is a reluctance to use PL/1 at the Service Center.

Beyond the choice of programming language, the question of growth and eventually transferability must be kept in mind. The system will grow most easily if it is constructed on modular lines such that successive modules can be introduced or upgraded independently of the rest of the system. Transferability is also enhanced by such an approach.

D.4.2 Documentation

It is not enough just to construct the proposed system, it must be thoroughly documented. This is absolutely essential and not a luxury, whether for an in-house system, or one bought from outside. Documentation is important since it protects the system from the effects of changing personnel, it facilitates communication about the system between various personnel working on it, and it makes subsequent modification enormously easier. Delivering or accepting a programming system without documentation is like delivering or accepting a major new building without any architectural plans.

Documentation can be addressed to different levels, from managerial to programmer. It can be at various levels of detail, from general

narrative, through basic design concepts, to the code of individual subroutines. It is not a trivial task to produce good documentation for a system, and some projects employ personnel for documentation in addition to those for actual programming.

At a minimum, documentation can include some or all of the features below:

- General narrative description
- Design characteristics
- Flow charts
- Program listings
- Operating instructions
- Input requirements and examples
- Output capability and examples
- Core and storage requirements
- Cost and timing data

D.4.3 Schedule

It is desirable, though not easy, to plan accurate schedules for the implementation of systems such as the one proposed. A schedule for the construction of the basic catalog data system within one calendar year is shown in Figure D.2. The State Library catalog would then begin. It is easy to be overly optimistic and the suggested schedule may need to be extended by up to fifty percent before being finalized.

D.5 System Costs

The aim of this appendix is to estimate the operating costs of the proposed computer system as represented by Figure D.1. Weekly batch processing cycles are assumed. (Development costs are something else again and are likely to occur at a high rate for a limited period of time.)

The method followed is:

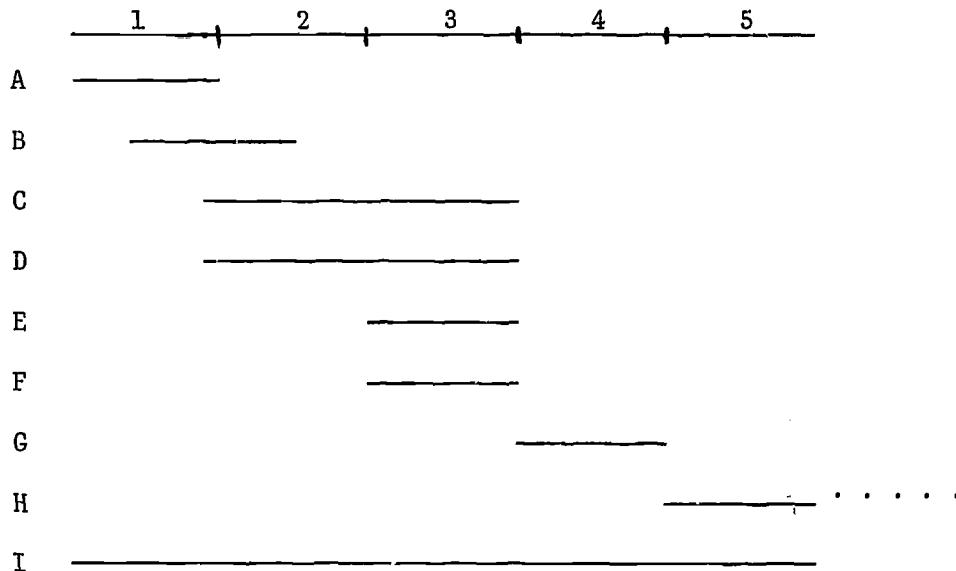
- a. To break down the system of Figure D.1 into such functions as cataloging, storage, processing and printing, and to estimate volumes;
- b. To estimate basic unit costs for these functions;
- c. To put these two sets of figures together.

FIGURE D.2
SYSTEM IMPLEMENTATION SCHEDULE

SYSTEM ACTIVITIES

- A Planning
- B Choice of processing formats
- C Original cataloging input module
- D Development of file control systems
- E Cataloging products output
- F Acquisition lists and statistics capability
- G Test
- H State Library Catalog
- I Existing commitments to regional libraries

QUARTERS



The results of such estimations are clearly approximate, but nevertheless a structure or model for computing total costs is exhibited. Alternate figures for unit costs or volumes can easily be entered into the model if desired.

The functions into which the system shown in Figure D.1 may be broken down are taken as the following:

- a. Cataloging. Cataloging of those items for which no MARC data is found (δQ).
- b. Manual.
 - (i) Manual entry of requests for catalog products into machine-readable form; i.e., keypunching and verification (ΔQ).
 - (ii) Entry of catalog data from (a) into machine-readable form (δQ).
- c. MARC subscription. The cost of the weekly MARC tape service from the Library of Congress.
- d. Storage. The four major files M, Q, P, H must be maintained on some storage medium. Magnetic tape back-up must be provided for reliability. Storage on magnetic tape, off-line and on-line disc will be considered.
- e. Processing. Processing consists of a number of functions:
 - (i) Sorting only occurs on entry of small files into system and will be ignored.
 - (ii) Merging.
 - (iii) Matching.
- f. Output. Line printer output will be considered for all new data entering the system in machine-readable form, or for increments to existing files, etc.
- g. Salaries. A figure for salaries will be assumed other than for the clerical or keypunch staff included in (b) above.

Flows are estimated in Table D.5. Units are characters or characters/week, and n is the number of weeks into the project. Unit costs are estimated in Table D.6. Flows and costs are consolidated in Table D.7 from which the costs of three different systems per week can be estimated, based upon differences in storage medium.

TABLE D.5
CALCULATION OF SYSTEM FLOWS
(Data from Exhibits 1 and 2)

<u>a. Cataloging</u>	
Original cataloging	600 records/week
$30,000/\text{year} = 600/\text{week}$	
<u>b. Manual</u>	
(i) Request for catalog products	300,000 characters/week
$300,000/\text{year} = 600/\text{week}$	
(ii) Entry of original cataloging	300,000 characters/week
$600 \times 500 = 300,000$	
<u>c. MARC Subscription</u>	
Not applicable	
<u>d. Storage</u>	
MARC cumulative file (M)	600,000 n characters
$(1200/\text{week}) \times n \text{ weeks} \times 500 = 600,000 n$	
Holdings cumulative file (H)	750,000 n characters
$37.5 \times 10^6 / 50 = 750,000$	
Query file (Q)	2,400,000 characters
In-process file (P)	18,000,000 characters
<u>e. Processing</u>	
(i) Sorting - ignored	
(ii) Merging is estimated by character count of files merged, on a weekly basis.	
Query file (Q)	2,400,000 characters
Query file increment (ΔQ)	300,000 characters
MARC file (M)	600,000 n characters
MARC file increment (ΔM)	600,000 characters
Various inputs to inprocess file (= ΔP)	3,000,000 characters
In-process file (P)	18,000,000 characters
In-process file increment (ΔP)	3,000,000 characters

TABLE D.5, cont.
CALCULATION OF SYSTEM FLOWS

Holdings file (H)	750,000 n characters
Holdings file increment (ΔH)	750,000 characters

(iii) Matching is estimated as merging.

Total query file (ΣQ)	2,700,000 characters
Total MARC file (ΣM)	600,000 n + 600,000 characters

Total query file (ΣQ)	2,700,000 characters
In-process file (P)	18,000,000 characters

Total query file (ΣQ)	2,700,000 characters
Holdings file (H)	750,000 n characters

Receipt cards (DR)	300,000 characters
Total in-process file (ΣP)	21,000,000 characters

f. Output (the following files are printed out weekly, for one purpose or another)

Query file increment (ΔQ)	300,000 characters
MARC file increment (ΔM)	600,000 characters
In-process file increment (ΔP)	3,000,000 characters
Holdings file increment (ΔH)	750,000 characters
Receipt cards (ΔR)	300,000 characters
Cataloging Products (ΔCP) (1,000 characters/record estimate)	6,000,000 characters

g. Salaries

Technical and other specialist salaries allocated to systems costs.

TABLE D.6
CALCULATION OF SYSTEM UNIT COSTS
(Data estimated and from Data Processing Service Center)
(Figures are rounded for convenience at right)

a.	<u>Cataloging</u> Figure used in Chapter VI	\$3.00/title
b.	<u>Manual</u> 10,000 characters/hour at \$5.50/hour for keypunch and verify	\$550/10 ⁶ characters
c.	<u>MARC subscription</u> \$800/year = \$16/week	\$16/week
d.	<u>Storage</u>	
	(i) Magnetic tape	
	Service Center rate = \$1.00/mo for 2400' tape Assuming 800 bpi density, Capacity = 2400 x 12 x 1600 = 46 x 10 ⁶ characters	\$.01/10 ⁶ characters/week
	(ii) Off-line disc	\$1.00/10 ⁶ characters/week
	Service Center rate = \$.50/mo for 2314 disc cylinder Cylinder = Pack/200 = 1.5 x 10 ⁵ characters	
	(iii) On-line disc	\$10/10 ⁶ characters/week
	As (ii) but \$5.00/mo	
e.	<u>Processing</u> Cost of merging and matching is assumed to be primarily input/ output and movement of characters. Estimate based on 20 microrecords per character of input files, and \$100/hr equivalent billing rate for 360 Model 50.	\$.50/10 ⁶ characters
	Rate = $\frac{100}{3600 \times 50,000}$ \$/character	
f.	<u>Printing</u> Estimate is based on running 1403 Printer at 1100 lines/minute, 75 characters/line average and \$15/hour equivalent billing rate.	\$11.00/10 ⁶ characters
	Rate = $\frac{15}{60 \times 300 \times 75}$ \$/character	
g.	<u>Salaries</u> Assume \$50,000/yr	\$1,000/week

System based on magnetic tape	$\$3,055 + n/\text{week}$
System based on off-line disc	$\$3,075 + 2n/\text{week}$
System based on on-line disc	$\$3,255 + 14n/\text{week}$

These figures are shown in graphical form in Figure D.3. From them and from those of Table D.7 a number of conclusions can be drawn.

Magnetic tape and off-line disc offer systems of comparable cost. On-line disc storage leads to progressively higher costs as time passes. Costs consist of two components, one fixed and one cumulative, the latter reflecting the growth of cumulative data files.

Taking the off-line disc system as an example, the weekly cost varies from about \$3,050 to \$3,150 during the first year with a mean of \$3,100. In the second and third years the mean costs are \$3,200 and \$3,300 per week. These correspond to annual figures of about \$155,000, \$160,000 and \$165,000 respectively. These are much less than the anticipated ideal savings of almost \$700,000 from centralization of cataloging shown in Table 1. Furthermore, this figure includes the cost of cataloging 73,000 titles at \$3.00/title in the centralized system, about \$220,000/year. Thus, the \$700,000 can be regarded as savings due to centralization which are conserved by an off-line disc computer system since its costs are even less than those of a centralized manual system.

A comparison of the costs of current, regional and centralized manual systems with the proposed automated system is shown in Figure D.4. These assume that current salaries, material costs, and yearly volumes acquired do not change, nor storage costs. In fact, it is likely that the latter will decrease and the remainder increase with time. The manual costs are for cataloging at \$3.00 per title, and the figures are obtained from Chapter 3.

Another point is that the cost of the machine components of the proposed system is only a small proportion of the total cost. Even if the figures shown are increased by a factor of 2 or 3, total costs are still dominated by cataloging costs and salaries. This means that a high-level programming language can probably be afforded, rather than having to stay with assembly language on the grounds of cost.

Storage costs show a hundredfold increase in going from magnetic tape to off-line disc, and tenfold in going to on-line disc. However, when seen in relation to the total system cost, or even in absolute dollar figures, off-line storage costs are slight; and even using on-line disc, a needless luxury at the present time, is not prohibitive.

In the off-line disc system, the machine-based costs for storage, processing, and printing are comparable, and this suggests that an attempt should be made to refine these estimates to see if one becomes dominant.

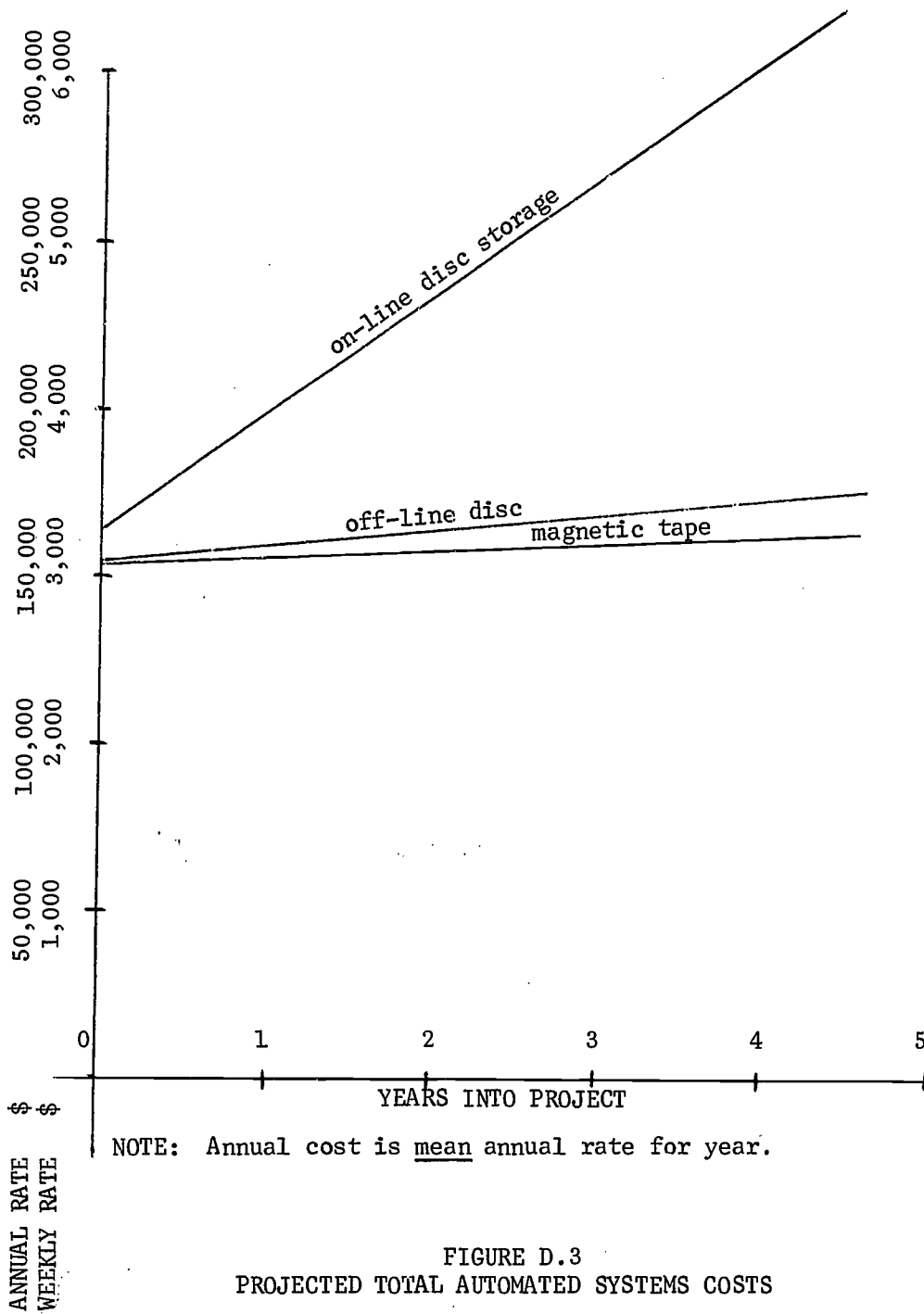
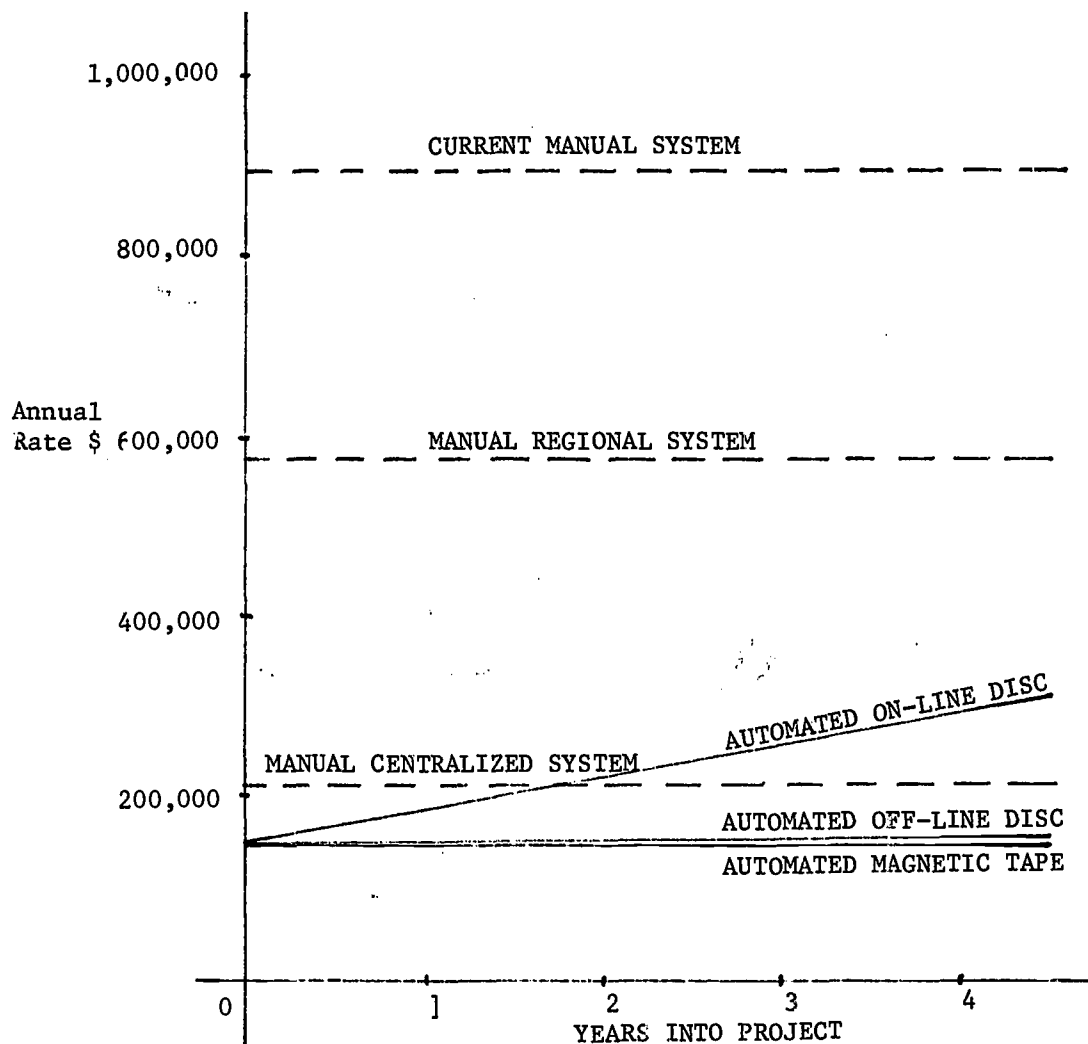


FIGURE D.3
PROJECTED TOTAL AUTOMATED SYSTEMS COSTS



NOTE: ANNUAL COST IS MEAN ANNUAL RATE.

FIGURE D.4 COMPARISON OF AUTOMATED AND MANUAL COSTS

TABLE D.7
SYSTEM COSTS BY FUNCTION

Note: Flows are consolidated for each function.
Units are characters per week except for cataloging.
Three sets of back-up files are assumed.
Cost figures are rounded for convenience and are dollars per week.

<u>FUNCTION</u>	<u>NUMBER OF UNITS</u>	<u>UNIT COST</u>	<u>COST</u>
Cataloging	600	\$3.00	\$1,800
Manual	300,000	\$550/10 ⁶	165
MARC subscription			16
Storage magnetic tape	20.4 x 10 ⁶ +1.35 n x 10 ⁶	\$.01/10 ⁶	0
Storage off-line disc	"	\$1.00/10 ⁶	20 + n
Storage on-line disc	"	\$10/10 ⁶	200 + 13 n
Backup files	61.2 x 10 ⁶ +4.05 n x 10 ⁶	\$.01/10 ⁶	1
Processing	76.05 x 10 ⁶ +2.7 n x 10 ⁶	\$.50/10 ⁶	40 + n
Printing	10.95 x 10 ⁶	\$3/10 ⁶	33
Salaries			1,000

The cost of back-up tapes for three complete sets of the major files is negligible.

D.6 Further Questions

This section outlines a number of questions that still need to be considered. They lie outside the scope of this appendix either in detail or in time-scale. Of course, if the basic technical system chosen to support the network is very different from that outlined earlier, then some of these questions may not be so pertinent.

- a. Design Details. The details of the system design must be settled, e.g., formats, file structures, indexes, processing functions. Essentially, this means that section D.3 must be redone in greater detail if there is acceptance of the basic system objectives.
- b. Catalog Production. The uses to which book or printed catalogs could be put in the network needs to be considered carefully. Their form, frequency, and costs should be studied. The question of line printer versus photo-composition versus microform needs to be resolved.
- c. Retrospective Cataloging. Apart from the development of a complete machine-based catalog for the State Library, there should be little activity in this area until national policies based on the Library of Congress RECON project begin to develop. However, this is a question which must be considered since the state almost certainly has unique holdings in northwest materials which will remain its cataloging responsibility.
- d. Interface Capability. The proposed network is not unique. Numerous other networks or groupings on a national, regional, or state-wide basis are in the process of development. Consideration must be given to the question of how the proposed network in Washington will interface with these. The MARC II format is one embryonic standard. Others are needed.
- e. Long-Range Planning. The system discussed in this appendix is only a first step in a continuous process of system development which will go on for years, even decades. Both the objectives and means of long-range system development must be considered. In the area of objectives, there are such features as interface with other systems, expanded system function, and more comprehensive operating data. In the area of means, there are such features as new hardware products, e.g., large cheap storage devices, and new software products, e.g., a suitable special purpose programming

language. With technical developments, certain cost constraints could change dramatically.

- f. Role of Pacific Northwest Bibliographic Center (PNBC). The recent Currier report on PNBC has considered many aspects of the operation of PNBC, but not those most pertinent to this appendix. The basic question is how can PNBC best be developed in relation to a mechanized system such as the network ultimately envisages. Since the network will provide comprehensive location information (within the state), the best role for PNBC would seem to be as an interstate system, linking a group of independent state systems.

Numbers paint a bleak picture of the future of PNBC as regards automation, and it is worthwhile considering these briefly. The figures below are taken from the Currier report and rounded off slightly.

Number of cards	4,000,000 cards
Additions	320,000 cards/yr.
Withdrawals	250,000 cards/yr.
Requests	20,000 /yr.
Budget (visible)	\$ 54,000 /yr.
Budget (invisible support from University of Wash- ington)	\$ 34,000 /yr.

The size of the main data file for an automated bibliographic retrieval system would approximate 2×10^9 or 2 billion characters. To convert a file of this size to machine-readable form and maintain it on a random access mass storage device for on-line inquiry is very expensive. It is not clear that the service as represented by 20,000 requests per year is worth the expense.

D.7 Summary

This appendix has discussed a number of technical aspects of the proposed network system from a general point of view.

The main finding is that, given that a centralized manual cataloging system will save \$700,000 annually by avoiding duplication of cataloging effort, then a computer system as described above will not only conserve but actually improve upon these savings. Each type of system will cost about \$200,000 annually. Even in the computer system machine costs are a fraction of total system costs.

Recommendations fall into two areas, one administrative and the other technical.

From an administrative point of view, it is important to build up or create adequate staff competency in the technical area. A machine-based system of the scope being discussed for the network requires technically qualified personnel to work with the design, implementation and operation. Secondly, it is necessary to begin to devise cost formulas and procedures so that the services that the machine-based system will offer can be established in a realistic, even if subsidized, framework.

From a technical point of view, the first thing to do is to begin to build a cumulative bibliographic data bank, an embryonic holdings data bank, based on the current acquisitions of the state's libraries and fed with bibliographic data from MARC or original cataloging. This is the basis for a service to individual libraries of catalog products for their acquisitions, e.g., catalog cards, book cards, spine labels. When this has been set up, the holdings of the State Library will be converted to a machine-based file and copies distributed widely in some print medium, e.g., photoreduced line printer output or microfiche.

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APPENDIX E

ADMINISTRATIVE DATA QUESTIONNAIRE AND ANALYSIS

This appendix gives details of the administrative data questionnaire, its administration, and the method used for its analysis.

E.1 Questionnaire

The questionnaire went through three preliminary drafts, the last of which was field-tested with a small group of respondents, most of whom were not in the actual sample population. An alerting letter was sent out on December 9, 1969. Three days later the questionnaire together with a covering letter was mailed to the 140 library heads who made up the survey population. These two letters and the questionnaire are shown as Exhibits E.1, E.2, and E.3. Of the 140 questionnaires sent out, 129 were returned, and of these, 119 were usable. In order to test the representativeness of the usable returns against the original sample, both were broken down by type of library, and the figures are shown in Table E.1. It should be noted that the categorization by type of library in the administrative study is not the same as is used in the rest of the study, e.g., Chapters 2-4.

The questionnaire was divided into three parts: the library of the respondent; personal interaction survey; and network opinion survey; and data from each section were coded for machine analysis. In addition, data from the second part were used directly for the sociometric analysis of section 5.4.

E.2 Coding of Data

Data for machine analysis were copied from each usable questionnaire onto a worksheet, using a scheme for data coding developed for the purpose. The worksheet and the data coding guide are shown as Exhibits E.4 and E.5. Data elements 4-6 (population serviced, size of collection and annual expenditure) were obtained from additional published statistical data. Data elements 2, 3, 8 (type of support, geographic area, status of librarian) were obtained indirectly from other specific answers. Data element 7 (characteristics of the librarian) was derived from the answers to part 2 of the Questionnaire, see also section 5.4.

E.3 Computer Analysis

Data were analyzed by a packaged program at the State Data Processing Service Center. The program used was BMD02S, Contingency Table Analysis, from the Health Sciences Computing Facility, UCLA, version of June 15, 1966.

Data were punched from the worksheets onto cards, two cards for each worksheet, using 136 consecutive columns, and input to the program using Fortran format (3X, 2F1.0, 73F1.0/56F1.0), thus skipping

the library identification code. The data, therefore, finally comprised 119 records of 132 data elements or variable values per record.

The program computes two-way tables for selected pairs of variables, together with a number of additional functions. When the cells in the table have expected frequencies less than a user-specified limit, then the table is collapsed by merging successive rows and columns until the frequencies have been raised above the limit set. In the present analysis this limit was set at one. For each of the original and collapsed tables, the following output was obtained: count rejects; frequency tables; row, column and table percentages; chi-square and degrees of freedom; contingency coefficient; and the quantity $-2 \log \lambda$, where λ is the maximum likelihood ratio. In addition, a list of the number of rejects for each variable taken singly was obtained. These arise from incompletely filled out questionnaires. The actual analyses chosen were pairwise tables for:

variable 1	v.	variable n , n = 2, ...132
variable 2	v.	variable n , n = 3, ...132
.		
.		
variable 12	v.	variable n , n = 13, ...132
variable 18	v.	variable n , n = 19, ...132
.		
.		
variable 22	v.	variable n , n = 23, ...132
and variable 33	v.	variable n , n = 34, ...132
variable 44	v.	variable n , n = 45, ...132
.		
.		
variable 121	v.	variable n , n = 122, ...132

These fall into two groups, complete sets of tables for variables 1 (type of library) through 12 (interlibrary loan) and 18 (participation) through 22 (familiarity), and then complete sets of tables for the semantic differential averages only, for a total of 2,561 tables. Collapsed tables were formed in addition for many of these original tables.

E.4. Interpretation of Computer Output

Interpretation of the computer output is based on the values for chi-square and degrees of freedom obtained for each table, either original or collapsed. The chi-square test is a test for statistical independence. Using published tables of the chi-square distribution, it is possible to find the probability that the two variables

being compared are independent. Low values of such probability are indicators of a significant lack of statistical independence, and one speaks of significance at the .01 level, for example. The contingency coefficient is a closely related measure which has the advantage of taking values between zero (completely independent) and one (completely dependent).

In general, tests for significance based on collapsed tables are more reliable than those based upon original tables. However, since collapsing results in merging columns and rows, the categorization of the two variables may change in an undesirable way.

An important question is what level of significance to choose. Frequently, a level of .05 or .01 is used. However, in the present case a large number of tables were obtained, in fact just over 2500. This means that 125 tables at the .05 level and 25 tables at the .01 level might be expected to occur randomly without any actual significance. The only way to avoid obtaining large numbers of tables whose levels of significance arose only by chance seemed to be to choose a high enough level of significance. Accordingly, the .001 level was considered. By chance, two or three tables are expected at this level of significance. In fact, there were 60. Therefore, the vast majority of these may be taken as genuinely significant. In contrast, there were about the same number of tables at the .01 level. 25 were expected. It would have been difficult in this case to place confidence in the results since one out of every two significant tables could have arisen randomly without any actual significance. To summarize, therefore, the level of significance used with the chi-square test throughout the data analysis of the next two sections is .001. Table E.2 summarizes all the correlations indicated by a significance level of .001. Unfortunately, many of these correlations are impossible to interpret directly from the significant tables, as explained in chapter 5. More refined methods of data analysis are required.

Tables E.3a to E.3k summarize the basic data on the respondents' libraries obtained through the questionnaire. Not all of the tables presented have 119 entries. This is because some questionnaires were incompletely filled out, leading to missing values for some data variables. This is not serious, except where a large number of values are missing.

TABLE E.1: REPRESENTATIVENESS OF USABLE RETURNS

TYPE OF LIBRARY	ORIGINAL SAMPLE		USABLE RETURNS		PERCENT USABLE RETURN
	NUMBER	PERCENT	NUMBER	PERCENT	
Public	48	34	44	37	92
Community College	22	16	21	17	95
College *	7	5	5	4	71
College-University**	12	9	9	8	75
Special	51	36	40	34	78
TOTAL	140	100	119	100	85

* Colleges offering bachelor's degree only.

** Colleges or universities offering advanced degrees.

TABLE E.2

SUMMARY OF SIGNIFICANT CORRELATION

Following each variable there is a list of variable numbers with which the first shows lack of statistical independence at the .001 level of significance. The numbering is as on the data worksheet and coding guide, Exhibits E.4 and E.5.

1. Type of library	2,4,5,9,10,11,12,20
2. Support	1,4,9,10
3. Geographic area	None
4. Population served	1,2,5,6,9,10,11,18
5. Size of collection	1,4,6,8,9,11,12,22
6. Annual expenditure	4,5,8
7. Characteristics of librarian	23.10,25.10,29.6,30.4,30.6, 30.9
8. Professional status of librarian	5,6,24.2,27.2,30.2,31.3, 32.9
9. Collection emphasis	1,2,4,5,10,11
10. Clientele needs	1,2,4,9,11
11. Circulation	1,4,5,9,10,12
12. Interlibrary loans	1,5,11,24.2,27.4
13. Informal interlibrary loans	None
14. Time lapse	None
15. Time 1970	None
16. Time 1973	None
17. Time 1975	None
18. Participation	4,23.1,23.4,32.1,32.3,32.6, 32.9,32.11
19. Recommendation	29.7
20. Discussion	1,22

TABLE E2: SUMMARY OF SIGNIFICANT CORRELATIONS, CONTINUED

21. Best information		None
22. Familiarity		5,20
23. Network	23.1	18
	23.4	18
	23.10	7
24. Regional centers	24.2	8.12
	24.11	28.11,30.6,30.9,30.11, 31.2
25. Central facility	25.10	7
26. Type of library center		None
27. Interlibrary loan	27.2	8
	27.4	12
	27.11	32.11
28. Centralized processing	28.11	24.11
29. Collection management	29.6	7
	29.7	19
	29.11	30.6,31.2,31.5
30. Facsimile transmission	30.2	8
	30.4	7
	30.6	7,24.11,29.11
	30.9	7,24.11
	30.11	24.11,32.2
31. Reference	31.2	24.11,29.11
	31.5	29.11
32. Union lists	32.1	18
	32.2	30.11
	32.3	18
	32.6	18
	32.9	8,18
	32.11	18,27.11

TABLE E.3a: BASIC DATA ON LIBRARIES
TYPE OF LIBRARY

Type of Library	Number of Libraries	Percent
Public	44	37
Community College	21	17
College*	5	4
College-University** . .	9	8
Special	40	34
Total:	119	100

* Colleges offering bachelor's degrees only.

** Colleges or universities offering advanced degrees.

TABLE E.3b: BASIC DATA ON LIBRARIES
SOURCE OF SUPPORT

Support	Number of Libraries	Percent
Public	85	71
Private	34	29
Total:	119	100

TABLE E.3c: BASIC DATA ON LIBRARIES
DISTRIBUTION BY REGION

Region	Number of Libraries	Percent
1	6	5
2	12	10
3	6	5
4	16	13
5	30	25
6	3	3
7	7	6
8	8	7
9	4	3
10	14	12
11	3	3
12	10	8
Total:	119	100

TABLE E.3d: BASIC DATA ON LIBRARIES
POPULATION SERVED

Population Served*	Number of Libraries	Percent
Large	12 . . .	10
Medium-Large	10 . . .	8
Medium-Small	44 . . .	38
Small	<u>51</u> . . .	<u>44</u>
Total:	117	100

* For exact population ranges see data coding guide,
Exhibit E.5.

TABLE E.3e: BASIC DATA ON LIBRARIES
SIZE OF COLLECTION

Size of Collection*	Number of Libraries	Percent
Large	11 . . .	12
Medium-Large	31 . . .	32
Medium-Small	24 . . .	25
Small	<u>30</u> . . .	<u>31</u>
	96	100

* For exact size ranges see data coding guide, Exhibit E.5.

TABLE E.3f: BASIC DATA ON LIBRARIES
ANNUAL EXPENDITURE

Annual Expenditure*	Number of Libraries	Percent
Large	42 . . .	55
Medium-Large	23 . . .	30
Medium-Small	11 . . .	14
Small	<u>1</u> . . .	<u>1</u>
	77	100

* For exact expenditure ranges see data coding guide,
Exhibit E.5.

TABLE E.3g: BASIC DATA ON LIBRARIES
COLLECTION EMPHASIS

Collection Emphasis	Number of Libraries	Percent
Research	19	16
Recreation	21	18
Curriculum Supportive . .	36	30
General Information . . .	29	25
Special Subject	<u>13</u>	<u>11</u>
Total:	118	100

TABLE E.3h: BASIC DATA ON LIBRARIES
CLIENTELE NEEDS

Clientele Needs	Number of Libraries	Percent
General Information . . .	34	29
Research Information . .	37	32
Recreation	26	22
Other	<u>20</u>	<u>17</u>
Total:	117	100

TABLE E.3i: BASIC DATA ON LIBRARIES
CIRCULATION

Circulation	Number of Libraries	Percent
Low	59	57
Medium-Low	15	14
Medium	14	13
Medium-High	12	12
High	<u>4</u>	<u>4</u>
Total:	104	100

* For exact circulation ranges see data coding guide,
Exhibit E.5.

TABLE E.3j: BASIC DATA ON LIBRARIES
INTERLIBRARY LOANS

Interlibrary Loans/Year	Number of Libraries	Percent
Under 100	50	46
100-200	23	21
200-300	11	10
300-400	6	5
400-500	2	2
Over 500	<u>18</u>	<u>16</u>
Total:	110	100

TABLE E.3k: BASIC DATA ON LIBRARIES
INFORMAL INTERLIBRARY LOANS

Informal Interlibrary Loans/Year	Number of Libraries	Percent
None	60	55
1-100	32	29
Over 100	<u>18</u>	<u>16</u>
Total:	110	100

UNIVERSITY OF WASHINGTON
Seattle, Washington
98105

School of Librarianship

December 9, 1969

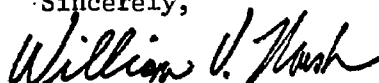
Dear Librarian:

As part of the planning for the Proposed Library Network for the State of Washington, a research project has been initiated by the Washington State Library. The School of Librarianship, along with selected faculty from other disciplines, constitutes the staff for the project.

The concept of the network, it was felt, needed some additional empirical data on which to base the best form, functions, procedures and equipment. Several investigators began working on the study. These were Dr. Robert Meier of the University of Washington School of Business Administration, Dr. Jonathan Stanfield of the University of Washington School of Librarianship, Dr. Roger Miller of the University of Washington Department of Economics and myself. For some months we have been busy collecting and analyzing various data. Now my part of the study requires that I obtain some data which are not available from other sources.

In the near future I will send you a questionnaire. The opinions of administrative heads of the libraries or library systems are vital. I am sure you will find the subject of our study of sufficient importance to future library development that you will take time to complete the questionnaire and return it. Thanks in advance for your assistance.

Sincerely,



William V. Nash
Associate Professor

WN:mr

EXHIBIT E.2

UNIVERSITY OF WASHINGTON
Seattle, Washington
98105

School of Librarianship

December 12, 1969

Dear Librarian:

Several days ago I wrote you about a study of the Washington State Library Network which is currently under way at the University of Washington. I indicated at that time I would send you a questionnaire. All administrative heads of libraries or library systems in the State are being asked to complete the questionnaire. The questionnaire is enclosed.

The data you supply will enable the research team to study the feasibility of such a network and the most likely form it should assume. Your response is vital! Thanks for cooperating.

The questionnaire employs several kinds of questions. For the most part the question form is based on techniques developed by several researchers of national reputation -- J. L. Moreno and Charles Osgood. These techniques are not widely known in librarianship, but are effective in helping interpret answers.

Outside of myself and a research assistant, answers will be confidential. The research team will receive the data in composite form only and any data appearing in the final report will also be composite.

A self-addressed stamped envelope is enclosed for your convenience. Please return the questionnaire by January 5, 1969 to facilitate the study.

Sincerely,



William V. Nash
Associate Professor

Enclosure

LIBRARY NETWORK FOR WASHINGTON STATE

EXHIBIT E.3

QUESTIONNAIRE

(All information is strictly confidential.)

Name of respondent _____

Name of library _____

Address of library _____

Position of respondent _____

Part I - The Library

1. Which of the following phrases characterize your collection? (Rate according to relative emphasis - 0 as not applicable, 1 very limited emphasis, to 7 as major emphasis. Circle the number that indicates your opinion.)

Research emphasis 0 1 2 3 4 5 6 7

Recreation emphasis 0 1 2 3 4 5 6 7

Curriculum supportive emphasis 0 1 2 3 4 5 6 7

General information emphasis 0 1 2 3 4 5 6 7

Special subject emphasis 0 1 2 3 4 5 6 7

Comments: (If any)

2. Clientele needs: Estimate the percentage of your patrons having the following primary library needs.

General information _____

Research information _____

Recreational reading _____

Other (explain) _____

Total 100%

Comments: (If any)

(All information is strictly confidential.)

3. What was your total circulation during the past fiscal year? _____

Comments: (If any)

4. How many books were borrowed from other libraries using formal interlibrary loan arrangements during the past fiscal year? _____

Comments: (If any)

5. How many books were borrowed from other libraries using arrangements other than formal interlibrary loan arrangements during the past fiscal year? _____

Comments: (If any)

6. What is the average response time between the request and receipt of material borrowed via:

(a) Formal interlibrary loan arrangements _____

(b) Other cooperative arrangements _____

Comments: (If any)

7. Bearing in mind cost and other factors, what is a functional realistic goal which should be reached by the end of the calendar year 1970 for the average response time from request of formal interlibrary loan to receipt of the material?

By the end of 1973? _____

By the end of 1975? _____

Comments: (If any)

(All information is strictly confidential.)

8. On the basis of what you now know, would you like to have your library participate in the Washington State Library Network?

Yes _____

No _____

Comments: (If any)

9. Do you feel your organization or institution would concur in your recommendation concerning participation in Washington State Library Network?

Yes _____

No _____

Comments: (If any)

(All information is strictly confidential.)

Part II - Personal Interaction Survey - In this part of the questionnaire we are requesting some rather personal information. The objective is to construct a graphic representation of informal communication patterns operating in the profession. While the data you supply is personal, it will be treated confidentially and will be summarized only in composite terms. Please answer each question as frankly as possible. Please do not leave any questions unanswered.

10. During the last year, to whom have you gone most often to discuss significant library administrative matters? With what frequency do these discussions occur? (Daily, weekly, monthly, etc.) (Exclude your immediate family and staff members.)
Please give a name or check the box at the end of the question.

Name _____

Address _____

Occupation _____

Frequency _____

☐ Turn to no one.

Comments: (If any)

11. During the past 2 years have you spent time discussing the Washington State Library Network with anyone other than individuals at Washington Governor's Conferences on Libraries or other Washington State Library sponsored meetings?

Yes _____ No _____

Comments: (If any)

(If YES, please answer the following questions.
(If No, please answer only #12 and then skip to Part III.)

(All information is strictly confidential.)

12. How did you get your best information on the network? (Rank 1-4 with 1 being the best medium and 4 being the poorest medium.)

Written (personal)
Written (published)
Oral (personal)
Oral (group)

Comments: (If any)

13. From whom or what source did your most reliable information come concerning evaluation of the network concept?

Name _____

Address _____

☐ From no one.

Comments: (If any)

14. Who has been your primary discussion partner during the past year in matters pertaining to the network system?

Name _____

Address _____

Occupation _____

How frequently have discussions been held? _____

☐ No one.

Comments: (If any)

(All information is strictly confidential.)

15. To whom would you go first for additional reliable information concerning evaluation of the network concept?

Name _____

Address _____

Occupation _____

☐

No one.

Comments: (If any)

16. Please rate your familiarity with the Washington State Library Network system on the following scale.

Completely familiar: _____:_____:_____:_____:_____:_____:_____ : Completely unfamiliar

Comments: (If any)

(Everyone answer these questions.)

If you feel that the concept at the top of the page is very closely related to one end of the scale, you should place your check-mark as follows:

(All information is strictly confidential.)

17. Washington State Library Network.

Useful : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Useless
Intuitive : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Rational
Progressive : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Regressive
Unimportant : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Important
Inexpensive : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Expensive
Untimely : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Timely
Prohibitive : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Permissive
Possible : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Impossible
Necessary : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Unnecessary
Peripheral : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Central

Comments: (If any)

Explanation of questions 18-20: The network may assume several administrative forms. For example, there may be regional centers through which loans and services are directed or there may be one central facility. There may be type of library centers (i.e. academic, public, special, or school). Please give your impressions of the following configurations.

- | | | | | | | | | |
|-------------|---|---|---|---|---|---|---|-------------|
| Useful | : | : | : | : | : | : | : | Useless |
| Intuitive | : | : | : | : | : | : | : | Rational |
| Progressive | : | : | : | : | : | : | : | Regressive |
| Unimportant | : | : | : | : | : | : | : | Important |
| Inexpensive | : | : | : | : | : | : | : | Expensive |
| Untimely | : | : | : | : | : | : | : | Timely |
| Prohibitive | : | : | : | : | : | : | : | Permissive |
| Possible | : | : | : | : | : | : | : | Impossible |
| Necessary | : | : | : | : | : | : | : | Unnecessary |
| Peripheral | : | : | : | : | : | : | : | Central |

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(All information is strictly confidential.)

19. Central facility - One central facility for the entire state to assist in processing and information service to local libraries.

Useful	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Useless
Intuitive	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Rational
Progressive	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Regressive
Unimportant	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Important
Inexpensive	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Expensive
Untimely	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Timely
Prohibitive	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Permissive
Possible	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Impossible
Necessary	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Unnecessary
Peripheral	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Central

Comments: (If any)

(All information is strictly confidential.)

20. Type of library center - A concept related to regional centers but with different organizational base. One center for all academic libraries, one center for public libraries, one center for school libraries, one for special libraries would serve to facilitate information services in the respective types of libraries.

Useful	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Useless
Intuitive	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Rational
Progressive	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Regressive
Unimportant	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Important
Inexpensive	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Expensive
Untimely	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Timely
Prohibitive	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Permissive
Possible	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Impossible
Necessary	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Unnecessary
Peripheral	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	_____	:	Central

Comments: (If any)

(All information is strictly confidential.)

Explanation of

questions 21-26: The Washington State Library Network may include several distinct activities. These may include the following: interlibrary loans, centralized processing of both acquisition and classification-cataloging, collection management i.e. development of special collections or collection emphasis and shifting of collections among libraries to meet local needs and demands, facsimile transmission or the sending of copies of materials via electronic means, the provision of reference and other information services for patrons of other libraries and development of union catalogs to use in location of materials. Please give your impression of each of these services.

21. Interlibrary loans.

Useful	: ____ : ____ : ____ : ____ : ____ : ____ : ____ :	Useless
Intuitive	: ____ : ____ : ____ : ____ : ____ : ____ : ____ :	Rational
Progressive:	____ : ____ : ____ : ____ : ____ : ____ : ____ :	Regressive
Unimportant:	____ : ____ : ____ : ____ : ____ : ____ : ____ :	Important
Inexpensive:	____ : ____ : ____ : ____ : ____ : ____ : ____ :	Expensive
Untimely	: ____ : ____ : ____ : ____ : ____ : ____ : ____ :	Timely
Prohibitive:	____ : ____ : ____ : ____ : ____ : ____ : ____ :	Permissive
Possible	: ____ : ____ : ____ : ____ : ____ : ____ : ____ :	Impossible
Necessary	: ____ : ____ : ____ : ____ : ____ : ____ : ____ :	Unnecessary
Peripheral	: ____ : ____ : ____ : ____ : ____ : ____ : ____ :	Central

Comments: (If any)

(All information is strictly confidential.)

22. Centralized processing - acquiring materials and cataloging-classification.

Useful : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Useless
Intuitive : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Rational
Progressive : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Regressive
Unimportant : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Important
Inexpensive : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Expensive
Untimely : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Timely
Prohibitive : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Permissive
Possible : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Impossible
Necessary : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Unnecessary
Peripheral : ____ : ____ : ____ : ____ : ____ : ____ : ____ : Central

Comments: (If any)

(All information is strictly confidential.)

23. Collection management -- democratization of materials, development of special collections and/or collection emphasis and shifting of collections to meet local needs and demands.

Useful	:	:	:	:	:	:	:	Useless
Intuitive	:	:	:	:	:	:	:	Rational
Progressive	:	:	:	:	:	:	:	Regressive
Unimportant	:	:	:	:	:	:	:	Important
Inexpensive	:	:	:	:	:	:	:	Expensive
Untimely	:	:	:	:	:	:	:	Timely
Prohibitive	:	:	:	:	:	:	:	Permissive
Possible	:	:	:	:	:	:	:	Impossible
Necessary	:	:	:	:	:	:	:	Unnecessary
Peripheral	:	:	:	:	:	:	:	Central

Comments: (If any)

24. Facsimile transmission of materials - sending copies via electronic means.

Comments: (If any)

25. Provision of reference and information services for patrons of other libraries.

Comments: (If any)

(All information is strictly confidential.)

26. Union lists to facilitate location of materials.

Useful : _____ : _____ : _____ : _____ : _____ : _____ : _____ : Useless
Intuitive : _____ : _____ : _____ : _____ : _____ : _____ : _____ : Rational
Progressive: _____ : _____ : _____ : _____ : _____ : _____ : _____ : Regressive
Unimportant: _____ : _____ : _____ : _____ : _____ : _____ : _____ : Important
Inexpensive: _____ : _____ : _____ : _____ : _____ : _____ : _____ : Expensive
Untimely : _____ : _____ : _____ : _____ : _____ : _____ : _____ : Timely
Prohibitive: _____ : _____ : _____ : _____ : _____ : _____ : _____ : Permissive
Possible : _____ : _____ : _____ : _____ : _____ : _____ : _____ : Impossible
Necessary : _____ : _____ : _____ : _____ : _____ : _____ : _____ : Unnecessary
Peripheral : _____ : _____ : _____ : _____ : _____ : _____ : _____ : Central
Comments: (If any)

(All information is strictly confidential.)

Comments: (If any) This sheet may be used for any type of comments that you might wish to express that you were not able to express in the other parts of the questionnaire regarding the network, the questionnaire in general, etc.

Please return questionnaire to:

William V. Nash
Associate Professor
School of Librarianship
University of Washington
Seattle, Washington 98105

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EXHIBIT E.4

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DATA CODING GUIDE

EXHIBIT E.5

DATA ELEMENT NUMBER	DATA ELEMENT NAME	DATA ELEMENT CODE	DATA ELEMENT VALUE	
0	Library Code	1-140	Assigned library identification code	
1	Type of Library	1 2 3 4 5	Public Community College College (bachelor's degree only) College-university (advanced degrees) Special	
2	Support	1 2	Public Private	
3	Geographic area by county (Bowerman region)	1 2 3 4 5 6 7 8 9 10 11 12	Clallam, Jefferson, Kitsap Grays Harbor, Mason, Thurston, Lewis, Pacific Cowlitz, Clark, Skamania, Klickitat, Wahkiakum Pierce King Snohomish, Island Skagit, Whatcom, San Juan Kittitas, Yakima Chelan, Douglas, Grant, Skanogan, Ferry Stevens, Spokane, Lincoln, Adams, Pend Oreille Whitman, Garfield, Asotin Columbia, Walla Walla, Franklin, Benton	
4	Population Served	1 2 3 4	PUBLIC: Over 100,000 25,000-100,000 5,000-25,000 Under 5,000	ACADEMIC: Over 10,000 5,000-10,000 1,000-5,000 Under 1,000
5	Size of Collection	1 2 3 4	PUBLIC Over 150,000 25,000-150,000 6,000-25,000 Under 6,000	ACADEMIC Over 500,000 100,000-500,000 50,000-100,000 Under 50,000
6	Annual Expenditure	1 2 3 4	Over \$100,000 \$25,000-100,000 \$4,000-25,000 Under \$4,000	
7	Characteristics of librarian	1 2 3 4 5	Isolate Localite Library localite Cosmopolite Library cosmopolite	

DATA CODING GUIDE

EXHIBIT E.5, cont.

DATA ELEMENT NUMBER	DATA ELEMENT NAME	DATA ELEMENT CODE	DATA ELEMENT VALUE
8	Professional status of librarian	1	Professional
		2	Non-professional
9	Collection emphasis	1	Research
		2	Recreation
		3	Curriculum supportive
		4	General information
		5	Special subject
10	Clientele needs	1	General information
		2	Research information
		3	Recreation
		4	Other
11	Circulation	1	Under 50,000
		2	50,000-100,000
		3	100,000-250,000
		4	250,000-1,000,000
		5	Over 1,000,000
12	Interlibrary loans	1	Under 100
		2	100-200
		3	200-300
		4	300-400
		5	400-500
		6	Over 500
13	Informal interlibrary loans	1	None
		2	1-100
		3	Over 100
14	Time lapse for interlibrary loan	1	0-3 days
		2	4-7 days
		3	8-14 days
		4	15-30 days
		5	Over 30 days
15	Time lapse 1970	1	1 day
16	Time lapse 1973	2	2-3 days
17	Time lapse 1975	3	4-7 days
		4	Over 8 days
18	Participation	1	No
		2	Yes
19	Recommendation	1	No
		2	Yes
20	Discussion	1	No
		2	Yes

DATA CODING GUIDE

EXHIBIT E.5, cont.

DATA ELEMENT NUMBER	DATA ELEMENT NAME	DATA ELEMENT CODE	DATA ELEMENT VALUE
21	Best information	1	Written personal
		2	Written published
		3	Oral personal
		4	Oral Group
22	Familiarity	1-7	From scale marked
23	Network	SEMANTIC DIFFERENTIAL. Each of the data elements 23-32 has 11 subelements, 10 for the components of the semantic differential (useful, intuitive, progressive, important, expensive, timely, permissive, possible, necessary, central) and one for the average. Each subelement takes a value 1-7 taken from the check on the appropriate scale in the questionnaire. The terms above are the positive poles of the semantic differential scales, irrespective of the direction of the scale on the questionnaire	
24	Regional centers		
25	Central facility		
26	Type of library center		
27	Interlibrary loan		
28	Centralized Processing		
29	Collection management		
30	Facsimile transmission		
31	Reference		
32	Union lists		

APPENDIX F ALTERNATE LIBRARY SYSTEM CONFIGURATIONS -- COMPUTER PROGRAM

Evaluation of alternate library system configurations requires that estimates be made of the operating characteristics of both present and proposed systems. Since necessary calculations are lengthy and must be repeated as data are refined and new concepts are developed, a computer program has been written to perform the calculations. The program is written in FORTRAN IV and has been run on the CDC 6400 computer at the University of Washington. It can be run on any computer with a FORTRAN IV compiler. Costs of running the program are modest with a typical compile and execute run of the program costing less than \$10.00.

F.1 Program Structure

The program is designed to permit rapid calculation of certain operating characteristics of alternate network configurations. Configurations included in the program are the present system of individual libraries, a regionally oriented network, and a state-wide network. The program ensures that all analyses are derived from a consistent set of base data and formalizes the method of analysis. In effect, the program serves as a model of the relationship between relevant parameters of alternate systems under study. The program permits changes in the base data or method of analysis and rapid rerun of the computations to observe effects of such changes. While the computations in the program are quite elementary and can easily be accomplished with a desk calculator, the speed of calculation possible with a digital computer offers the opportunity for much more refinement of computation and experimentation with alternate methods of calculation. The current version of the program is the result of evolutionary development and refinement over a period of some six months.

The program consists of a main routine called NETWORK and four subroutines called INPUT, INTLOAN, TECHSER, AND COLMGMT. The main routine NETWORK performs no function other than to call the other subroutines. The subroutine INPUT handles input data only and performs no analytical calculations; the other subroutines deal with inter-library loans, technical services, and collection management respectively. INPUT supplies data to the three other subroutines and must always be included in a run of the program. However, INTLOAN, TECHSER, and COLMGMT are completely independent from one another and can be deleted from a run simply by removing the card with the calling statement from NETWORK. This modular construction permits development and experimentation with one part of the program without the expense of rerunning the entire program. Descriptions of the subroutines are given in the following sections of this appendix. NETWORK has not been described further since it is merely a set of calls to the subroutines. A complete listing of the entire program is given in Section F.7 of this appendix. Because of space

limitations, complete output from the program has not been included in this report. Summaries of the results of the calculations are shown in Tables 2.7, 3.4 and 4.10.

F.2 Subroutine INPUT

Input to the program is a deck of cards containing data for each library followed by a blank card and a deck giving the names of the different types of libraries in the system. Two cards are used per library with information punched as shown in Figure F.1. The libraries do not need to be in any particular order in the data deck. The two cards for each library, however, must be kept together and in order. All data except for the library names and library types are punched with a decimal point and may be placed anywhere in the fields shown in Figure F.1. Information on the cards is described in greater detail below.

Library Card 1:

Library (Cols. 1-10) - Name of library. Libraries may not be given identical names.

Type (Cols. 11-13) - Type of library numerically coded as follows:

1. Public libraries
2. University libraries
3. College libraries
4. Community college libraries
5. State libraries

Region (Cols. 14-16) - Geographic region number in which library is located.

Patrons (Cols. 17-25) - Number of patrons served by library.

Volumes (Cols. 26-34) - Number of volumes in library.

Titles (Cols. 35-43) - Number of different titles in library.

Volumes acquired (Cols. 44-52) - Number of volumes acquired in past year.

Titles acquired (Cols. 53-61) - Number of titles acquired in past year.

Regional titles (Cols. 62-70) - Number of unique titles in library on a regional basis.

State titles (Cols. 71-79) - Number of unique titles in library on a state-wide basis.

Library Card 2:

Library (Cols. 1-10) - Name of library.

Borrowings (Cols. 17-25) - Number of volumes borrowed by library in past year.

Library Type Card:

Type (Cols. 1-10) - Name of type of library designated by type code. First card gives name of type 1, second card type 2, etc.

As data concerning each library is read in, it is immediately printed out in list form as shown under RUN INPUT DATA in Figure F.2. Total number of libraries and number of regions are also tabulated and printed out. Libraries are then sorted by type and individual, regional, and state-wide statistics are printed out for each library type. Data are then summarized and printed out by region and in total for all library types taken together. Output is shown under STATISTICS in Figure F.2.

F.3 Subroutine INTLOAN

INTLOAN calculates the amount and costs of interlibrary loans for the present system, a regional network, and a state-wide network. Costs are the sum of borrowings costs of the receiving libraries and lending costs of the lending libraries.

The number of volumes borrowed is input data for each library and is assumed to be the same for all systems. Undoubtedly borrowings would rise with better organized systems such as the regional and state-wide networks, but for purposes of comparison this increase has not been estimated. The cost of borrowings is estimated to be \$4.50 per volume and is assumed to be the same for all types of libraries.

For the present system, lending activity of the ten libraries in the state with any significant amount of interlibrary loans is estimated

by $NLOANSX = NTSVLBR \times p_i$

where $NLOANSX$ = number of loans made by one of the top eight libraries.

$NTSVLBR$ = number of total volumes borrowed in the state.

p_i = proportion of total loans in the state made by library i of the eight lending libraries

PRI. MR.	1	1	7	760	8766	8522	676	656	170	85	0
LYNDEN	1	1	7	2950	6221	8191	397	373	164	82	11
LACONNER	1	1	7	675	7616	7387	259	234	146	74	0
FERDALE	1	1	7	2450	4813	4668	261	246	94	47	0
CONCRETE	1	1	7	720	4624	4485	335	315	90	45	75
C. WASH.	3	8	8	9832	159156	110001	17817	12314	110001	4477	625
YAK. V. R.	1	1	8	142745	240559	101988	11047	4630	62609	4724	980
ELLENBURG	1	1	8	13990	27859	24225	2265	1915	6192	485	243
YAKIMA V.	4	8	8	3320	24493	20382	2175	1814	2397	408	100
SELAH	1	1	8	3300	17819	17283	2281	2146	2074	173	0
TOPPENISH	1	1	8	6000	15992	13906	750	634	695	139	65
GRANDVIEW	1	1	8	3800	12367	11995	461	434	240	120	116
CLE Elton	1	1	8	1800	4345	4214	38	36	84	42	10
N. GEN. R.	1	1	9	124259	265491	64029	20687	2335	64029	1284	1864
EPHRA	1	1	9	6800	30194	26256	2064	899	15982	525	147
WENAT. V.	4	9	9	1763	28180	19434	3919	2701	10970	194	150
BIG BEND	4	9	9	1177	19111	14792	3821	2958	6432	148	100
BREWSTER	1	1	9	1157	4953	4804	194	183	1402	68	56
SPOKANE P.	1	1	10	188500	359332	181023	21134	6005	181023	32150	760
E. WASH.	3	10	10	6223	130479	87368	3552	2378	56300	1748	900
SPOKANE C.	1	1	10	105892	154361	72122	11881	5982	24839	3202	253
SPOKANE	4	1	10	4615	41268	22392	4800	2597	13724	448	30
DAVENPORT	1	1	10	1460	12750	12367	385	362	247	124	160
RITZVILLE	1	1	10	1800	10945	10616	502	472	212	106	100
COLVILLE	1	1	10	3770	9457	84	384	361	190	95	113
OTHELLO	1	1	10	3962	8522	8266	593	558	166	83	462
MILBUR	1	1	10	1007	6331	6141	526	495	124	61	287
CHEWELAH	1	1	10	1535	6178	5992	404	380	120	60	133
KETTLE F.	1	1	10	920	5870	5694	155	1460	114	57	20
ODESSA	1	1	10	1256	5226	5069	151	142	102	51	9
EDWALL	1	1	10	125	4508	4372	169	159	88	44	20
REARDAN	1	1	10	359	3638	3529	224	211	70	35	43
METALINES	1	1	10	600	2346	3148	168	158	64	31	69
HARRINGTON	1	1	10	600	2346	2275	217	204	46	23	7
SPRAGUE	1	1	10	520	1835	1780	68	64	36	18	59
SPRINGDALE	1	1	10	213	930	902	13	112	18	9	0
WASH. ST.	2	11	11	15656	815330	263052	38045	13371	283052	81264	375
WHITMAN C.	1	1	11	15249	53548	53525	3734	2877	32939	1071	439
ASOTIN C.	1	1	11	14095	23221	22671	939	880	6899	453	105
PULLMAN	1	1	11	20500	24822	21499	2447	2117	4299	430	103
POMEROY	1	1	11	2200	8298	8068	187	181	805	80	50
ASOTIN	1	1	11	745	5344	5183	126	119	260	52	0
RICHLAND	1	1	12	28900	80602	78523	4761	2893	78523	1570	328
MID-COL. R	1	1	12	71720	125206	73741	14709	3847	28744	1674	404
WALLA WAL	1	1	12	26500	54179	51945	2824	2573	14386	1039	122
PASCO	1	1	12	17000	52634	38223	3144	2168	6647	764	270
COLL. BASIN	4	1	12	2855	20923	16194	2300	1781	10306	182	80
PROSSER	1	1	12	3075	15823	15347	882	630	1535	153	62
WALLA WAL.	4	1	12	1380	16231	12563	8009	6193	5025	126	20
OATON	1	1	12	3100	8866	8599	259	244	430	86	12
WATTSBURG	1	1	12	1070	2246	2178	167	157	66	22	12
STATE TOTAL				3416716	10236625	4623199	743353	299559	2988600	1128865	32637

TOTAL NUMBER OF LIBRARIES IN RUN - 106
TOTAL NUMBER OF REGIONS IN RUN - 12

FIGURE F.2, cont.

STATISTICS

PUBLIC LIBRARIES

PATRONS SERVED	VOLUMES		TITLES		ACQUIRED		REGIONAL TITLES		STATE TITLES		BORROWED VOLUMES	
REGION 1												
KITSAP RG.	102800	162044	59160	13491	4207	59160	1184	375				
P. ANGELES	16125	43489	37817	2702	2284	20731	756	220				
CLALLAM C.	17375	50204	38558	3727	2572	18031	729	300				
P. TOWNS.	5425	22983	19985	697	589	6995	200	394				
REGION TOTAL	141725	278766	153420	20617	9652	102917	2869	1289				
REGION 2												
TIMBER. R.	205888	399709	105000	26134	5432	57152	3990	2005				
CHEHALIS	5565	25846	22475	1312	1109	3908	450	149				
SHELTON	6450	17729	15417	789	667	771	154	395				
LEWIS	964	5163	5008	138	130	150	50	46				
REGION TOTAL	218867	448947	147900	28373	7338	61981	4644	2595				
REGION 3												
LONGVIEW	29550	73297	63617	5829	3918	63617	1272	409				
FT VAN. R.	127727	183455	43387	7608	2144	20995	868	327				
CAMAS	6075	32312	28619	1723	1118	8709	572	240				
KELSO	10600	54567	22047	1212	1025	3306	441	239				
GOLDENDALE	2860	8214	7967	394	371	398	80	198				
CASTL. ROCK	1490	6824	6619	268	252	66	66	4				
WHITE SAL.	1965	6455	5261	180	169	126	63	110				
KALAMA	1215	4523	4387	200	188	88	44	0				
CATHLAMET	660	4566	4371	164	154	88	44	0				
REGION TOTAL	181742	374753	187271	16978	9339	97552	3450	1527				
REGION 4												
TACOMA P.	161000	476153	149586	25072	8326	149586	8721	221				
PIERCE C.	203774	208943	70204	23982	6045	28215	1404	1642				
PUYALLUP	15000	33024	28637	2276	1932	2509	577	137				
MILTON	2800	9259	8984	911	857	449	90	0				
REGION TOTAL	382574	727379	257611	52251	17160	180759	10792	2000				
REGION 5												
SEATTLE P.	591800	1375069	387677	76535	11305	211827	211827	737				
KING C.	472630	762106	91853	105637	5270	15578	2462	5473				
RENTON	26400	73453	59621	6709	8228	1192	57	57				
AUBURN	21300	32577	28015	5231	4395	1175	568	148				
ENUMCLAH	4135	12735	12352	1052	990	248	124	202				
REGION TOTAL	1115465	2256040	579918	197759	28670	237056	216173	6617				
REGION 6												

EVERETT P.	57172	127989	103927	7219	5308	103927	3107	170
SNO-STEE R	220555	206530	77006	21662	6694	39826	1540	2087
SNOHOMISH	4990	15418	14954	1289	1213	2360	150	73
REGION TOTAL	282817	349937	195887	30170	13215	146115	4797	2330
REGION 7								
BELLINGHAM	38000	124011	84769	6769	3993	49604	1776	239
WHATCOM C.	43930	86209	53489	3261	1727	15731	1070	54
MT VERNON	8500	30444	26473	1745	1475	6340	529	131
AMCORTES	3120	19843	17255	707	598	2588	173	374
BURLINGTON	3195	13046	12654	1053	991	1265	127	70
SEDOO-WOL.	4140	13041	12649	821	772	633	126	85
EASTSOUND	1000	12405	12032	1039	977	360	120	15
FRJ. HBR.	780	8786	8522	676	536	170	85	0
LYNDEN	2950	8221	8191	397	373	164	82	11
LACONNER	675	7616	7387	249	234	146	74	0
FERNDAL	2100	4813	4668	261	246	94	47	0
CONCRETE	700	4624	4485	335	315	90	45	75
REGION TOTAL	114580	335099	256574	17313	12337	77185	4254	1054
REGION 8								
YAK. V. R.	148745	240559	101588	11047	4630	62609	4724	980
ELLENSBURG	13020	27859	24225	2265	1915	6192	485	243
SELAH	3700	17819	17283	2281	2146	2074	173	0
TOPPENISH	6000	15992	13906	750	634	695	139	65
GRANDVIEW	3800	12367	11995	461	434	240	120	116
CLE ELUM	1800	4345	4214	38	36	84	42	10
REGION TOTAL	177445	318941	173211	16842	9795	71894	5683	1414
REGION 9								
N. GEN. R.	124259	265491	64029	20687	2335	64029	1284	1864
EPHRA TA	6800	30194	26256	1064	899	15982	525	147
BREWSTER	1157	4953	4804	194	183	1402	48	56
REGION TOTAL	132216	300636	95089	21945	3417	81413	1857	2067
REGION 10								
SPOKANE P.	288500	389332	181023	21134	6009	181023	32150	760
SPOKANE C.	105892	104361	72122	11881	6982	24839	3202	253
DAVENPORT	1460	12750	12367	385	362	247	124	160
RITZVILLE	1800	10945	10616	302	472	212	106	100
COLVILLE	3770	9750	9457	384	364	190	95	113
OTHELLO	3962	8522	8266	593	558	166	83	462
WILBUR	1007	6331	6141	526	495	124	61	287
CHEWELAH	1535	6178	5992	404	330	120	60	133
KETTLE F.	920	5670	5694	1552	1460	114	57	20
ODESSA	1250	5226	5059	151	142	102	51	9
EDWALL	125	4500	4372	169	159	88	44	20
REARDAN	359	3638	3529	224	211	70	35	43
METALINES	710	3246	3148	168	158	64	31	69
HARRINGTON	600	2346	2275	217	204	46	23	7
SPRAGUE	520	1835	1780	68	64	36	18	59
SPRINGDALE	213	930	902	13	112	18	9	0
REGION TOTAL	312623	575768	332753	38371	18129	207439	36149	2495
REGION 11								

WHITMAN U.	15249	65348	53525	3734	2877	32939	1071	439
ASOTIN C.	14055	23221	22671	939	880	6899	453	105
FULLMAN	20500	24822	21499	2447	2117	4293	430	103
POMEROY	2200	8298	8048	187	181	805	80	50
ASOTIN	745	5344	5183	126	119	260	52	0
REGION TOTAL	52749	127033	110926	7433	6174	45202	2086	697

REGION 12

RICHMOND	28900	80602	78523	4781	2893	78523	1570	328
MID-COL. R	71720	125206	73741	14709	3847	28744	1474	404
WALCA WAL	28500	94179	51945	2884	2573	14986	1039	122
PASCO	17000	52634	38223	3144	2158	6647	764	270
PROSSER	3075	15823	19347	882	830	1535	153	62
DAYTON	3100	8866	8599	259	244	430	86	12
WATTSBURG	1070	2246	2178	167	157	86	22	12
REGION TOTAL	151365	339556	268596	26826	12712	130931	5108	1210

STATE TOTAL	3264268	6432351	2759116	474878	147938	1440504	297862	25295
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UNIVERSITY LIBRARIES

PATRONS SERVED	VOLUMES	TITLES	VOLUMES ACQUIRED	TITLES ACQUIRED	REGIONAL TITLES	STATE TITLES	VOLUMES BORROWED
REGION 1 NO LIBRARIES							
REGION 2 NO LIBRARIES							
REGION 3 NO LIBRARIES							
REGION 4 NO LIBRARIES							
REGION 5							

U OF WASH.	41296	1704698	709144	84352	35090	709144	709144	167
REGION TOTAL	41296	1704698	709144	84352	35090	709144	709144	167

REGION 6 NO LIBRARIES								
--------------------------	--	--	--	--	--	--	--	--

REGION 7 NO LIBRARIES								
--------------------------	--	--	--	--	--	--	--	--

REGION 8 NO LIBRARIES								
--------------------------	--	--	--	--	--	--	--	--

REGION 9 NO LIBRARIES								
--------------------------	--	--	--	--	--	--	--	--

REGION 10 NO LIBRARIES								
---------------------------	--	--	--	--	--	--	--	--

REGION 11

WASH. ST.	15656	805330	283052	38045	13371	283052	81264	375
REGION TOTAL	15656	805330	283052	38045	13371	283052	81264	375
REGION 12								
NO LIBRARIES								
STATE TOTAL	56952	2510028	992196	122397	48461	992196	790408	542

COLLEGE LIBRARIES

PATRONS SERVED		VOLUMES	TITLES	VOLUMES ACQUIRED	TITLES ACQUIRED	REGIONAL TITLES	STATE TITLES	VOLUMES BORROWED
REGION 1	NO LIBRARIES							
REGION 2	NO LIBRARIES							
REGION 3	NO LIBRARIES							
REGION 4	NO LIBRARIES							
REGION 5	NO LIBRARIES							
REGION 6	NO LIBRARIES							
REGION 7								

W. WASH.	9121	195363	120016	27498	22128	120016	9697	3200
REGION TOTAL	9121	195363	120016	27498	22128	120016	9697	3200

C. WASH.	9832	159158	110001	17817	12314	110001	4477	625
REGION TOTAL	9832	159158	110001	17817	12314	110001	4477	625

REGION 9	NO LIBRARIES							
REGION 10								

E. WASH.	6223	130479	87368	3552	2378	56300	1748	900
REGION TOTAL	6223	130479	87368	3552	2378	56300	1748	900

REGION 12
NO LIBRARIES

STATE TOTAL 25176 48500 317385 48817 36820 285317 15922 4725

COM. COLL. LIBRARIES

PATRONS SERVED VOLUMES TITLES VOLUMES TITLES REGIONAL TITLES STATE VOLUMES TITLES BORROWED

REGION 1

OLYMPIC 4570 30893 21306 2390 2109 13316 426 174
PENINSULA 1043 17560 14583 2022 1692 2084 146 200
REGION TOTAL 5613 48393 35889 4412 3801 15400 572 374

REGION 2

GRAYS HBP. 2989 29800 20276 3070 2068 2384 406 24
CENTRALIA 1916 20552 14872 2228 1606 744 149 10
REGION TOTAL 4905 49952 35148 5298 3674 3128 555 34

REGION 3

CLARK 4123 27551 19000 2087 1444 10530 190 10
LOWER COL. 2236 20500 15867 1000 777 4958 159 32
REGION TOTAL 6359 48051 34867 3087 2221 15488 349 42

REGION 4

TACOMA 3208 40466 23804 6938 4070 6925 866 20
FT STEIL. 1115 10387 8656 4156 3462 1298 87 24
REGION TOTAL 4323 50853 32460 11094 7532 8223 953 44

REGION 5

SHORELINE 5358 44982 26460 8698 5107 5390 1471 38
HIGHLINE 4764 39500 22333 3000 2010 2218 447 30
SEATTLE 9701 40772 22120 7498 4070 2011 442 10
BELLEVUE 1930 30734 21300 5022 3480 1545 425 20
G. RIVER 4120 25340 17748 4299 3017 1800 177 30
REGION TOTAL 25873 175328 109961 28517 17684 12964 2963 128

REGION 6

EVERETT 4651 35014 23206 2013 1322 13053 464 28
EDMONDS 1682 12600 10500 1200 998 2940 105 35
REGION TOTAL 6333 47614 33706 3213 2320 15993 569 63

REGION 7

SKAGIT V. 2684 29935 20644 1959 1362 3443 413 10

FIGURE F.2, cont. 261

REGION 8	REGION TOTAL	2684	29955	20644	1959	1342	3443	413	10
YAKIMA V.	3320	24493	20382	2175	1814	2397	408	100	
REGION TOTAL	3320	24493	20382	2175	1814	2397	408	100	
REGION 9									
WENAT. V.	1733	28180	19434	3919	2701	10970	154	150	
BIG BEND	1177	19111	14792	3621	2958	6452	148	100	
REGION TOTAL	2960	47291	34226	7740	5659	17422	342	250	
REGION 10									
SPOKANE	4615	41268	22392	4800	2597	13724	448	30	
REGION TOTAL	4615	41268	22392	4800	2597	13724	448	30	
REGION 11									
NO LIBRARIES									
REGION 12									
COL. BASIN	2855	28223	16194	2300	1781	10306	162	80	
WALLA WALLA	1380	16231	12563	8009	6193	5025	126	20	
REGION TOTAL	4235	37154	28757	10309	7974	15331	288	100	
STATE TOTAL	70320	600332	408432	82534	56618	123513	7860	1175	
STATE									
LIBRARIES									
PATRONS SERVED									
VOLUMES									
TITLES									
ACQUIRED									
VOLUMES									
TITLES									
REGION 1									
NO LIBRARIES									
REGION 2									
WASH.S.L.	0	208914	156070	14727	9732	156070	16613	900	
REGION TOTAL	0	208914	156070	14727	9732	156070	16613	900	
REGION 3									
NO LIBRARIES									
REGION 4									
NO LIBRARIES									
REGION 5									
NO LIBRARIES									
REGION 6									
NO LIBRARIES									

REGION	NO LIBRARIES
REGION 8	
NO LIBRARIES	
REGION 9	
NO LIBRARIES	
REGION 10	
NO LIBRARIES	
REGION 11	
NO LIBRARIES	
REGION 12	
NO LIBRARIES	
STATE TOTAL	0 208914 146070 14727 9732 146070 16813 900

~~ALL LIBRARIES~~

	PATRONS SERVED	VOLUMES	TITLES	VOLUMES ACQUIRED	TITLES ACQUIRED	REGIONAL TITLES	STATE TITLES	VOLUMES BORROWED
REGION 1	147338	327153	189309	25029	13453	118317	3441	1663
REGION 2	228872	707313	329118	48328	20744	211179	22012	3529
REGION 3	189101	422804	222138	20065	11560	113080	3799	1569
REGION 4	386897	778232	290071	63345	24692	188982	11745	2044
REGION 5	1182694	4130766	1399023	370628	81444	959164	928280	6912
REGION 6	289150	397551	229593	33383	15535	162108	5366	2393
REGION 7	125685	560397	397234	46720	35807	200544	14369	5264
REGION 8	190597	502592	303594	36834	23923	184292	10564	2139
REGION 9	135176	347329	128315	20685	9076	98835	2199	2317
REGION 10	323461	747515	442513	48723	25104	277483	38345	3425
REGION 11	68409	932363	393978	49678	19545	328294	63350	1072
REGION 12	155600	376710	297313	37135	20686	146262	5396	1310
STATE TOTAL	3416716	10236625	4623199	743353	299569	2988600	1328865	32637

FIGURE F.2, cont.

Values of p_i are shown in Chapter 2, Table 2.6. Cost of lending is estimated to be \$1.50 per volume and is assumed to be the same for all types of libraries.

For the regional network loans of each library are the sum of loans made within the region and loans made to libraries outside the region. Loans made within the region by each library are calculated

$$\text{by} \quad \text{NLOANSR} = \text{NTRVLBR}(K) \times \text{RGPRCNT} \times (\text{RLIBUNQ}/\text{REGNUNQ})$$

where NLOANSR = number of loans made by a library to other libraries within the region

K = region number

$\text{NTRVLBR}(K)$ = number of total volumes borrowed by libraries in region K

RGPRCNT = percent of borrowings by libraries within region K that can be obtained within the region

RLIBUNQ = regional unique titles of lending library

REGNUNQ = total unique titles in all libraries in region K

and $\text{RGPRCNT} = \text{REGNUNQ}/\text{STATUNQ}$

where STATUNQ = total unique titles in all libraries in state

Loans made to libraries in each region outside the one in which the lending library is located are calculated as follows and summed for all regions.

$$\text{NLOANSS} = \text{NTRVLBR}(L) \times (1. - \text{RGPRCNT}) \times (\text{SLIBUNQ}/(\text{STATUNQ} - \text{SREGUNQ}))$$

where NLOANSS = number of loans made by library to libraries in other regions

L = region to which loans are made

$\text{NTRVLBR}(L)$ = number of volumes borrowed by libraries in region L

RGPRCNT = percent of borrowings by libraries within region L that can be obtained within region

SLIBUNQ = statewide unique titles of lending
library

STATUNQ = total unique titles in all libraries
in state

SREGUNQ = contribution of libraries in region L
to total unique titles in all libraries
in state

and RGPRCNT is computed as previously. Cost of lending to libraries both within the region and outside the region is estimated to be \$1.50 per volume and is assumed to be the same for all types of libraries.

For the state-wide network loans of each library are computed as follows

$$NLOANSX = NTSVLBR \times (SLIBUNQ/STATUNQ)$$

where NLOANSX = number of loans made by a library to
other libraries in the state

NTSVLBR = total number of volumes borrowed in
the state

SLIBUNQ = state-wide unique titles of lending
library

STATUNQ = total unique titles in all libraries
in state

Cost of lending is estimated to be \$1.50 per volume regardless of type of library.

F.4 Subroutine TECHSER

TECHSER calculates the quantity and costs of processing volumes and titles for the present system, a regional network, and a state-wide network. Total costs for each library are the sum of costs of processing volumes acquired and titles acquired. The number of volumes acquired and number of titles acquired is input data for each library.

Volume processing costs are estimated to be \$.60 per volume and are assumed to be the same for all libraries. The number of volumes acquired and cost of processing these volumes is the same for all three systems.

For the present system the number of titles processed by each library is the number of titles acquired. Cost of processing is estimated to be \$5.00 per title and is the same for all libraries.

In the regional network it is assumed that libraries within the region share cataloging of titles within the region. Costs to a library of processing a title are estimated to be \$2.00 per title plus a prorated share of cataloging costs in the region of \$3.00 per title. For each library the total cost of processing titles is calculated

$$\text{by} \quad \text{KTITPRC} = \text{NTITACQ}(\text{I},\text{J}) \times 2.00 + (\text{NTITACQ}(\text{I},\text{J}) \times (\text{REGNUNQ}/\text{REGNTIT}) \times 3.00)$$

where KTITPRC = cost to a library of processing titles acquired

I = library number

J = library type

$\text{NTITACQ}(\text{I},\text{J})$ = number of titles acquired by library I,J

REGNUNQ = number of unique titles in region

REGNTIT = total number of titles in all libraries in region

In effect, the term $(\text{REGNUNQ}/\text{REGNTIT})$ is the average amount of cataloging that must be done for each title acquired by a library in the region when cataloging is shared by all libraries in the region.

In the state-wide network it is assumed that libraries share cataloging throughout the state. Costs to a library of processing a title are estimated to \$2.00 per title plus a prorated share of cataloging costs in the state of \$3.00 per title. For each library the total cost of processing titles is calculated

$$\text{by} \quad \text{KTITPRC} = \text{NTITACQ}(\text{I},\text{J}) \times 2.00 + (\text{NTITACQ}(\text{I},\text{J}) \times (\text{STATUNQ}/\text{STATIT}) \times 3.00)$$

where KTITPRC = cost to a library of processing titles acquired

I = library number

J = library type

$\text{NTITACQ}(\text{I},\text{J})$ = number of titles acquired by library I,J

STATUNQ = number of unique titles in state

STATIT = total number of titles in all libraries in state

The term (STATUNQ/STATIT) is the average amount of cataloging that must be done for each title acquired by a library when cataloging is shared by all libraries in the state.

F.5 Subroutine COLMGMT

COLMGMT calculates the number and cost of maintaining low circulation volumes for the present system, a regional network, and a state-wide network. Because of the lack of data and absence of theoretical development of concepts of collection management, this subroutine is the least well developed of the three cost calculation subroutines.

Low circulation volumes for the present system are estimated

by $NLCVOLM = NTITLES(I,J) \times .50$

where $NLCVOLM$ = number of low circulation volumes maintained

I = library number

J = library type

$NTITLES(I,J)$ = number of titles in library I,J

For the regional network, low circulation volumes maintained in the system are estimated

by $NLCVOLM = NRUNQTI(I,J) \times .50$

where $NLCVOLM$ = number of low circulation volumes maintained

I = library number

J = library type

$NRUNQTI(I,J)$ = regional unique titles of library I,J

This calculation is based on the assumption that low circulation volumes will be maintained at only one library in the region and that low circulation volumes are approximately 50% of the titles in the region.

For the state-wide network low circulation volumes maintained in the system are estimated

by $NLCVOLM = NSUNQTI(I,J) \times .50$

where NLCVOLM = number of low circulation volumes
maintained

I = library number

J = library type

NSUNQTI(I,J) = state-wide unique titles of library
I,J

This calculation is based on the assumption that low circulation volumes will be maintained at only one library in the state and that low circulation volumes are approximately 50% of the titles in the state.

Cost of maintaining low circulation volumes is estimated to be \$.20 per volume per year regardless of library type. The cost per volume is assumed to be the same for all three systems.

F.6 Program Variables

The following is a listing of all program variables and their meaning. Throughout the program the subscripts I, J and K have been used consistently with I referring to library number (numbered in sequence within type), J referring to type, and K referring to region. The subscript L is used for region in place of K in one instance.

BOROWS	-number of volumes borrowed by library
IREGION(I,J)	-region number of library
KBOROWS	-cost of volumes borrowed by library
KILLONS	-cost of interlibrary loan activity of library
KLCVOLM	-cost of low circulation volumes maintained by library
KLOANSX	-cost of volumes loaned by library
KPRILLN	-cost of interlibrary loan activity for present system for one region
KPRILLS(J,K)	-cost of interlibrary loan activity for present system
KPRLCVL(J,K)	-cost of low circulation volumes maintained for present system
KPRLWCV	-cost of low circulation volumes maintained for present system for one region

KPROCSS	-cost of technical services for library
KPRPRCS(J,K)	-cost of technical services for present system
KPRPROC	-cost of technical services for present system for one region
KPSILLS	-cost of interlibrary loan activity for present system for one library type
KPSLCVL	-cost of low circulation volumes maintained for present system for one library type
KPSPRCS	-cost of technical services for present system for one library type
KPSTILL	-total cost of interlibrary loan activity for present system
KPSTLCV	-total cost of low circulation volumes maintained for present system
KPSTPRC	-total cost of technical services activity for present system
KRBORWS	-cost of volumes borrowed in region for one library type
KRLOANS	-cost of volumes loaned in region for one library type
KRRILN	-cost of interlibrary loan activity for regional network for one region
KRRILLS(J,K)	-cost of interlibrary loan activity for regional network
KRRLCVL(J,K)	-cost of regional network low circulation volumes maintained
KRRLWCV	-cost of low circulation volumes maintained for regional network for one region
KRRPRCS(J,K)	-cost of technical services for regional network
KRRPROC	-cost of technical services for regional network for one region

KRSILLS	-cost of interlibrary loan activity for regional network for one library type
KRSLCVL	-cost of low circulation volumes maintained for regional network for one library type
KRSPRCS	-cost of technical services for regional network for one library type
KRSTILL	-total cost of interlibrary loan activity for regional network
KRSTLCV	-total cost of low circulation volumes maintained for regional network
KRSTPRC	-total cost of technical services for regional network
KRTITPR	-cost of titles processed in region by one library type
KRVOLPR	-cost of volumes processed in region by one library type
KSBORWS	-cost of volumes borrowed in state by one library type
KSILLNS	-cost of interlibrary loan activity in state by one library type
KSLCVOL	-cost of low circulation volumes maintained in state by one library type
KSLOANS	-cost of volumes loaned in state by one library type
KSPROCS	-cost of technical services in state for one library type
KSRILLN	-cost of interlibrary loan activity for state-wide network for one region
KSRILLS(J,K)	-cost of interlibrary loan activity for state-wide network
KSRLCVL(J,K)	-cost of low circulation volumes maintained for statewide network

KSRLWCV	-cost of low circulation volumes maintained for state-wide network for one region
KSRPRCS(J,K)	-cost of technical services for state-wide network
KSRPROC	-cost of technical services for state-wide network for one region
KSSILLS	-cost of interlibrary loan activity for state-wide network for one library type
KSSLCVL	-cost of low circulation volumes maintained for state-wide network for one library type
KSSPRCS	-cost of technical services for state-wide network for one library type
KSSTILL	-total cost of interlibrary loan activity for state-wide network
KSSTLCV	-total cost of low circulation volumes maintained for state-wide network
KSSTPRC	-total cost of technical services for state-wide network
KSTITPR	-cost of titles processed in state for one library type
KSVOLPR	-cost of volumes processed in state for one library type
KTITPRC	-cost of processing titles acquired by one library
KVOLPRC	-cost of processing volumes acquired by one library
LIBRAR	-library name
LIBRARY(I,J)	-library name
LIBTYPE(J)	-type name
NBOROWS(I,J)	-number of volumes borrowed by library
NLBTYP(J)	-number of libraries of one type

NLCVOLM	-number of low circulation volumes maintained by a library
NLIBRAR	-number of libraries in input data
NLOANSR	-number of volumes loaned within region by a library
NLOANSS	-number of volumes loaned outside region by one library
NLOANSX	-number of volumes loaned by a library
NPRINTS	-number of libraries printed under regional heading (0 if none, 1 if one or more)
NRBOROWS	-number of volumes borrowed in region by one library type
NRGIONS	-number of regions
NRLCVOL	-number of low circulation volumes maintained in region by one library type
NRLOANS	-number of volumes loaned in region by one library type
NRRUNQT	-number of regional unique titles in region for one library type
NRSERVD	-number of patrons served in region by one library type
NRSUNQT	-number of state-wide unique titles in region for one library type
NRTITAQ	-number of titles acquired in region for one library type (sum of titles acquired by individual libraries without regard for duplication)
NRTITLS	-number of titles in region for one library type (sum of titles in individual libraries without regard for duplication)
NRUNQTI(I,J)	-number of unique titles in library on regional basis

NRVOLAQ	-number of volumes acquired in region by one library type
NRVOLBR	-number of volumes borrowed in region by one library type
NRVOLMS	-number of volumes in region for one library type
NSBORWS	-number of volumes borrowed in state by one library type
NSERVED(I,J)	-patrons served by library
NSLCVOL	-number of low circulation volumes maintained in state by one library type
NSLOANS	-number of volumes loaned in state by one library type
NSRUNQT	-number of regional unique titles in state for one library type (sum of titles in individual libraries without regard for duplication)
NSSERVD	-number of patrons served in state by one library type
NSSUNQT	-number of unique titles in state for one library type
NSTITAQ	-number of titles acquired in state by one library type (sum of titles acquired by individual libraries without regard for duplication)
NSTITLS	-number of titles in state for one library type (sum of titles in individual libraries without regard for duplication)
NSUNQTI(I,J)	-number of unique titles in library on state-wide basis
NSVOLAQ	-number of volumes acquired in state for one library type
NSVOLBR	-number of volumes borrowed in state by one library type

NSVOLMS	-number of volumes in state for one library type
NTITACQ(I,J)	-number of titles acquired by library
NTITLES(I,J)	-number of titles in library
NTRRUQT(K)	-total unique titles in region
NTRSERV(K)	-total patrons served in region
NTRSUQT(K)	-total unique titles contributed by region to state-wide unique titles
NTRTITA(K)	-total titles acquired in region (sum of titles acquired without regard for duplication)
NTRTITS(K)	-total titles in region (sum of titles in individual libraries without regard for duplication)
NTRVLBR(K)	-total volumes borrowed by libraries in region
NTRVOLA(K)	-total volumes acquired in region
NTRVOLS(K)	-total volumes in region
NTSRUQT	-total regional unique titles in state (sum of titles in individual regions without regard for duplication)
NTSSERV	-total patrons served by libraries in state
NTSSUQT	-total unique titles in state
NTSTITA	-total titles acquired in state (sum of titles acquired by individual libraries without regard for duplication)
NTSTITS	-total titles in state (sum of titles in individual libraries in state without regard for duplication)
NTSVLBR	-total volumes borrowed in state
NTSVOLS	-total volumes in state

NTSVOLA	-total volumes acquired in state
NTYPSLB	-number of types of libraries
NUMLIBS	-number of libraries of one type
NVOLACQ(I,J)	-number of volumes acquired by library
NVOLUMS(I,J)	-number of volumes in library
REGION	-region number of library
REGNTIT	-total titles in region (sum of titles in individual libraries without regard for duplication)
REGNUNQ	-total unique titles in region
RGPRCNT	-regional percent
RLIBUNQ	-number of unique titles in library on regional basis
RUNQTI	-number of unique titles in library on regional basis
SERVED	-patrons served by library
SLIBUNQ	-number of unique titles in library on state-wide basis
SREGUNQ	-total unique titles contributed by region to state-wide unique titles
STATTIT	-total titles in state (sum of titles in individual libraries without regard for duplication)
STATUNQ	-total unique titles in state
SUNQTI	-number of unique titles in library on state-wide basis
TITACQ	-number of titles acquired by library
TITLES	-number of titles in library
TYPELB	-type of library
VOLACQ	-number of volumes acquired by library
VOLUMS	-number of volumes in library


```

PROGRAM NETWORK(INPUT,OUTPUT,TAPE 5=INPUT,TAPE 6=OUTPUT)
COMMON LIBRARY(100,5),NRUNQTI(100,5),NSUNQTI(100,5)
COMMON IREGION(100,5),NSERVED(100,5),NVOLUMS(100,5)
COMMON NTITLES(100,5),NVOLACQ(100,5),NTITACQ(100,5)
COMMON NBOROWS(100,5)
COMMON LIBTYPE(5),NLBTYPE(5)
COMMON NRGIONS,NTYPSLB
COMMON NTRSERV(15),NTRVOLS(15),NTRTITS(15),NTRVOLA(15)
COMMON NTRTITA(15),NTRRUQT(15),NTRSUQT(15),NTRVLBR(15)
COMMON NTSSERV,NTSVOLS,NTSTITIS,NTSVOLA
COMMON NTSTITA,NTSRUQT,NTSSUQT,NTSVLBR
COMMON KPRILLS(5,15),KRRILLS(5,15),KSRILLS(5,15)
COMMON KPRPRCS(5,15),KRRPRCS(5,15),KSRPRCS(5,15)
COMMON KPRLCVL(5,15),KRRLCVL(5,15),KSRLCVL(5,15)
CALL INPUT
CALL INTLOAN
CALL TECHSER
CALL COLMGMT
STOP
END

```

FIGURE F.3
ALTERNATE LIBRARY SYSTEM CONFIGURATIONS - PROGRAM LISTING

FIGURE F.3

```

SUBROUTINE INPUT
COMMON LIBRARY(100,5),NRUNQTI(100,5),NSUNQTI(100,5)
COMMON IREGION(100,5),NSERVED(100,5),NVOLUMS(100,5)
COMMON NTITLES(100,5),NVOLACQ(100,5),NTITACQ(100,5)
COMMON NBOROWS(100,5)
COMMON LIBTYPE(5),NLBTYPE(5)
COMMON NRGIONS,NTYPSLB
COMMON NTKSERV(15),NTRVOLS(15),NTRTITS(15),NTRVOLA(15)
COMMON NTKTITA(15),NTRRUQT(15),NTRSUQT(15),NTRVLBR(15)
COMMON NTSERV,NTSVOLS,NTSTITS,NTSVOLA
COMMON NTSTITA,NTSRUQT,NTSSUQT,NTSVLBR
COMMON KPRILLS(5,15),KRRILLS(5,15),KSRILLS(5,15)
COMMON KPRPRCS(5,15),KRRPRCS(5,15),KSRPRCS(5,15)
COMMON KPRLCVL(5,15),KRRLCVL(5,15),KSRLCVL(5,15)
1000 FORMAT(A10,2F3,0,7F0,0)
1001 FORMAT(16X,F0,0)
1010 FORMAT(1H1,14HRUN INPUT DATA,///)
1020 FORMAT(1H ,40X,10H PATRONS,20X,10H VOLUMES,10H TITLES,
X10H REGIONAL,10H STATE,10H VOLUMES)
1025 FORMAT(1H ,20X,10H PATRONS,20X,10H VOLUMES,10H TITLES,
X10H REGIONAL,10H STATE,10H VOLUMES)
1030 FORMAT(1H ,10X,10HLIBRARY ,10H TYPE,10H REGION,
X10H SERVED,10H VOLUMES,10H TITLES,10H ACQUIRED,
X10H ACQUIRED,10H TITLES,10H TITLES,10H BORROWED,/)
1035 FORMAT(1H ,20X,10H SERVED,10H VOLUMES,10H TITLES,
X10H ACQUIRED,10H ACQUIRED,10H TITLES,10H TITLES,
X10H BORROWED,/)
1040 FORMAT(1H ,A10,10X,10F10,0)
1045 FORMAT(1H0,7X,11HSTATE TOTAL,22X,8I10,/)
1050 FORMAT(1H0,35HTOTAL NUMBER OF LIBRARIES IN RUN - ,I3)
1060 FORMAT(1H ,33HTOTAL NUMBER OF REGIONS IN RUN - ,I2)
1070 FORMAT(1H1,10HSTATISTICS,///)
1080 FORMAT(1H ,A10,10H LIBRARIES,/)
1090 FORMAT(1H ,10H REGION,I3,/)
1100 FORMAT(1H ,10X,A10,8I10)
1110 FORMAT(1H+,7X,12HNO LIBRARIES,/)
1120 FORMAT(1H0,7X,12HREGION TOTAL,1X,8I10,/)
1130 FORMAT(1H0,7X,11HSTATE TOTAL,2X,8I10,////////)
1140 FORMAT(1H ,13HALL LIBRARIES,/)
1150 FORMAT(1H ,10H REGION,I3,7X,8I10)
1160 FORMAT(1H0,7X,11HSTATE TOTAL,2X,8I10)
C
C PRINT OUT INPUT DATA
C
WRITE(6,1010)
WRITE(6,1020)
WRITE(6,1030)
10 NLIBRAR=NLIBRAR+1
READ(5,1000)LIBRAR,TYPELB,REGION,SERVED,VOLUMS,TITLES,VOLACQ,
X TITACQ,RUNQTI,SUNQTI
IF(VOLUMS.EQ.0) GO TO 20
READ(5,1001)BOROWS
WRITE(6,1040)LIBRAR,TYPELB,REGION,SERVED,VOLUMS,TITLES,VOLACQ,
X TITACQ,RUNQTI,SUNQTI,BOROWS
IF(REGION.GI.NRGIONS) NRGIONS=REGION
IF(TYPELB.GI.NITYPSLB) NITYPSLB=TYPELB

```

FIGURE F.3

```

J=TYPELB
NLBTYPE(J)=NLBTYPE(J)+1
I=NLBTYPE(J)
LIBRARY(I,J)=LIBRAR
IREGION(I,J)=REGION
NSERVED(I,J)=SERVED
NVOLUMS(I,J)=VOLUMS
NTITLES(I,J)=TITLES
NVOLACQ(I,J)=VOLACQ
NTITACQ(I,J)=TITACQ
NRUNQTI(I,J)=RUNQTI
NSUNQTI(I,J)=SUNQTI
NBOROWS(I,J)=BOROWS
NTSSERV=NTSSERV+SERVED
NTSVOLS=NTSVOLS+VOLUMS
NTSTITS=NTSTITS+TITLES
NTSVOLA=NTSVOLA+VOLACQ
NTSTITA=NTSTITA+TITACQ
NTSRUQT=NTSRUQT+RUNQTI
NTSSUQT=NTSSUQT+SUNQTI
NTSVLBR=NTSVLBR+BOROWS
GO TO 10
20 NLIBRAR=NLIBRAR-1
WRITE(6,1045)NTSSERV,NTSVOLS,NTSTITS,NTSVOLA,NTSTITA,NTSRUQT,
X      NTSSUQT,NTSVLBR
WRITE(6,1050)NLIBRAR
WRITE(6,1060)NRGIONS
DO 30 J=1,NTYPSLB
READ(5,1000)LIBTYPE(J)
30 CONTINUE
WRITE(6,1070)
DO 60 J=1,NTYPSLB
WRITE(6,1080)LIBTYPE(J)
WRITE(6,1025)
WRITE(6,1035)
NUMLIBS=NLBTYPE(J)
NSSERVD=0
NSVOLMS=0
NSTITLS=0
NSVOLAQ=0
NSTITAQ=0
NSRUNQT=0
NSSUNQT=0
NSVOLBR=0
DO 50 K=1,NRGIONS
WRITE(6,1090)K
NRSERVD=0
NRVOLMS=0
NRTITLS=0
NRVOLAQ=0
NRTITAQ=0
NRRUNQT=0
NRSUNQT=0
NRVOLBR=0
DO 40 I=1,NUMLIBS
IF(IREGION(I,J).NE.K) GO TO 40

```

FIGURE F.3

```

NSSERV D=NSSERV D+NSERV D(I,J)
NRSERV D=NRSERV D+NSERV D(I,J)
NSVOLMS=NSVOLMS+NVOLUMS(I,J)
NRVOLMS=NRVOLMS+NVOLUMS(I,J)
NSTITLS=NSTITLS+NTITLES(I,J)
NRTITLS=NRTITLS+NTITLES(I,J)
NSVOLAQ=NSVOLAQ+NVOLACQ(I,J)
NRVOLAQ=NRVOLAQ+NVOLACQ(I,J)
NSTITAQ=NSTITAQ+NTITACQ(I,J)
NRTITAQ=NRTITAQ+NTITACQ(I,J)
NSRUNQT=NSRUNQT+NRUNQTI(I,J)
NRRUNQT=NRRUNQT+NRUNQTI(I,J)
NSSUNQT=NSSUNQT+NSUNQTI(I,J)
NRSUNQT=NRSUNQT+NSUNQTI(I,J)
NSVOLBR=NSVOLBR+NBOROWS(I,J)
NRVOLBR=NRVOLBR+NBOROWS(I,J)
WRITE(6,1100) LIBRARY(I,J),NSERV D(I,J),NVOLUMS(I,J),NTITLES(I,J),
X      NVOLACQ(I,J),NTITACQ(I,J),NRUNQTI(I,J),NSUNQTI(I,J),
X      NBOROWS(I,J)
40 CONTINUE
   IF(NRVOLMS.EQ.0) GO TO 45
   WRITE(6,1120) NRSERV D,NRVOLMS,NRTITLS,NRVOLAQ,NRTITAQ,NRRUNQT,
X      NRSUNQT,NRVOLBR
   NTRSERV(K)=NTRSERV(K)+NRSERV D
   NTRVOLS(K)=NTRVOLS(K)+NRVOLMS
   NTRTITS(K)=NTRTITS(K)+NRTITLS
   NTRVOLA(K)=NTRVOLA(K)+NRVOLAQ
   NTRTITA(K)=NTRTITA(K)+NRTITAQ
   NTRRUQT(K)=NTRRUQT(K)+NRRUNQT
   NTRSUQT(K)=NTRSUQT(K)+NRSUNQT
   NTRVLBR(K)=NTRVLBR(K)+NRVOLBR
   GO TO 50
45 WRITE(6,1110)
50 CONTINUE
   WRITE(6,1130) NSSERV D,NSVOLMS,NSTITLS,NSVOLAQ,NSTITAQ,NSRUNQT,
X      NSSUNQT,NSVOLBR
60 CONTINUE
   WRITE(6,1140)
   WRITE(6,1025)
   WRITE(6,1035)
   DO 70 K=1,NRGIONS
   WRITE(6,1150) K,NTRSERV(K),NTRVOLS(K),NTRTITS(K),NTRVOLA(K),
X      NTRTITA(K),NTRRUQT(K),NTRSUQT(K),NTRVLBR(K)
70 CONTINUE
   WRITE(6,1160) NTSSERV,NTSVOLS,NTSTITS,NTSVOLA,NTTITA,NTSRUQT,
X      NTSSUQT,NTSVLBR
   RETURN
   END

```

FIGURE F.3

```

SUBROUTINE INTLOAN
COMMON LIBRARY(100,5),NRUNQTI(100,5),NSUNQTI(100,5)
COMMON IREGION(100,5),NSERVED(100,5),NVOLUMS(100,5)
COMMON NTITLES(100,5),NVOLACQ(100,5),NTITACQ(100,5)
COMMON NBOROWS(100,5)
COMMON LIBTYPE(5),NLBTYPE(5)
COMMON NRGIONS,NTYPSLB
COMMON NTKSERV(15),NTRVOLS(15),NTRTITS(15),NTRVOLA(15)
COMMON NTKTITA(15),NTRRUQT(15),NTRSUQT(15),NTRVLBR(15)
COMMON NTSSERV,NTSVOLS,NTSTITS,NTSVOLA
COMMON NTSTITA,NTSRUQT,NTSSUQT,NTSVLBR
COMMON KPRILLS(5,15),KRRILLS(5,15),KSRILLS(5,15)
COMMON KPRPRCS(5,15),KRRPRCS(5,15),KSRPRCS(5,15)
COMMON KPRLCVL(5,15),KRRLCVL(5,15),KSRLCVL(5,15)
1000 FORMAT(1H,24HPRESENT SYSTEM INTER-LIBRARY LOANS,///)
1010 FORMAT(1H ,A10,10H LIBRARIFS,/)
1015 FORMAT(1H ,60X,10H      TOTAL)
1020 FORMAT(1H ,20X,10HBORROWINGS,10H      COST,10H      LOANS,
X10H      COST,10H      COST,/)
1030 FORMAT(1H ,10H      REGION,I3,/)
1040 FORMAT(1H ,10X,A10,5I10)
1050 FORMAT(1H0,7X,12HREGION TOTAL,1X,5I10,/)
1060 FORMAT(1H+,7X,12HNO LIBRARIES,/)
1070 FORMAT(1H0,7X,11HSTATE TOTAL,2X,5I10,////////)
1075 FORMAT(1H0,7X,11HSTATE TOTAL,2X,3I10,////////)
1100 FORMAT(1H1,26HREGIONAL NETWORK INTER-LIBRARY LOANS,///)
1200 FORMAT(1H1,27HSTATEWIDE NETWORK INTER-LIBRARY LOANS,///)
1300 FORMAT(1H1,25HINTER-LIBRARY LOANS FOR ALL SYSTEMS,///)
1310 FORMAT(1H ,30X,10H REGIONAL,10H STATEWIDE)
1320 FORMAT(1H ,20X,10H PRESENT,10H NETWORK,10H NETWORK)
1330 FORMAT(1H ,20X,10H      COST,10H      COST,10H      COST,/)
1340 FORMAT(1H ,10H      REGION,I3,7X,3I10)
1350 FORMAT(1H ,13HALL LIBRARIFS,/)
C
C      CALCULATE PRESENT SYSTEM INTER-LIBRARY LOANS
C
WRITE(6,1000)
DO 60 J=1,NTYPSLB
WRITE(6,1010)LIBTYPE(J)
WRITE(6,1015)
WRITE(6,1020)
NUMLIBS=NLBTYPE(J)
NSBORWS=0
KSBORWS=0
NSLOANS=0
KSLOANS=0
KSILLNS=0
DO 50 K=1,NRGIONS
WRITE(6,1030)K
NRBORWS=0
KRBORWS=0
NRLOANS=0
KRLOANS=0
NPRINTS=0
DO 40 I=1,NUMLIBS
IF(IREGION(I,J).NE.K) GO TO 40

```

FIGURE F.3

```

NRBORWS=NRBORWS+NRBORWS(I,J)
NSBORWS=NSBORWS+NSBORWS(I,J)
KBOROWS=NBOROWS(I,J)*4.50
KRBORWS=KRBORWS+KBOROWS
KSBORWS=KSBORWS+KBOROWS
NLOANSX=0
IF(LIBRARY(I,J).EQ.10HWASH.S.L.) NLOANSX=NTSVLBR*.63
IF(LIBRARY(I,J).EQ.10HSEATTLE P.) NLOANSX=NTSVLBR*.13
IF(LIBRARY(I,J).EQ.10HII OF WASH.) NLOANSX=NTSVLBR*.10
IF(LIBRARY(I,J).EQ.10HEVERETT P.) NLOANSX=NTSVLBR*.04
IF(LIBRARY(I,J).EQ.10HTACOMA P.) NLOANSX=NTSVLBR*.04
IF(LIBRARY(I,J).EQ.10HSPOKANE P.) NLOANSX=NTSVLBR*.02
IF(LIBRARY(I,J).EQ.10HWASH. ST.) NLOANSX=NTSVLBR*.02
IF(LIBRARY(I,J).EQ.10HTIMBER. R.) NLOANSX=NTSVLBR*.02
NRLOANS=NRLOANS+NLOANSX
NSLOANS=NSLOANS+NLOANSX
KLOANSX=NLOANSX*1.50
KRLOANS=KRLOANS+KLOANSX
KSLOANS=KSLOANS+KLOANSX
KILLONS=KBOROWS+KLOANSX
KPRILLS(J,K)=KPRILLS(J,K)+KILLONS
KSILLNS=KSILLNS+KILLONS
WRITE(6,1040)LIBRARY(I,J),NBOROWS(I,J),KBOROWS,NLOANSX,KLOANSX,
XKILLONS
NPRINTS=1
40 CONTINUE
IF(NPRINTS.EQ.0) GO TO 45
WRITE(6,1050)NRBORWS,KRBORWS,NRLOANS,KRLOANS,KPRILLS(J,K)
GO TO 50
45 WRITE(6,1060)
50 CONTINUE
WRITE(6,1070)NSBORWS,KSBORWS,NSLOANS,KSLOANS,KSILLNS
60 CONTINUE

C
C
C
CALCULATE REGIONAL NETWORK INTER-LIBRARY LOANS

WRITE(6,1100)
DO 120 J=1,NTYPSLR
WRITE(6,1010)LIBTYPE(J)
WRITE(6,1015)
WRITE(6,1020)
NUMLIBS=NLBTYPF(J)
NSBORWS=0
KSBORWS=0
NSLOANS=0
KSLOANS=0
KSILLNS=0
DO 110 K=1,NRGIONS
WRITE(6,1030)K
NRBORWS=0
KRBORWS=0
NRLOANS=0
KRLOANS=0
NPRINTS=0
REGNUNQ=NTRRUQT(K)
STATUNQ=NTSSUQT

```

FIGURE F.3

```

RGPRCNT=REGNUNQ/STATUNQ
DO 100 I=1,NUMLIBS
  IF(IREGION(I,J).NE.K) GO TO 100
  NRBORWS=NRBORWS+NBOROWS(I,J)
  NSBORWS=NSBORWS+NBOROWS(I,J)
  KBOROWS=NBOROWS(I,J)*4.50
  KRBORWS=KRBORWS+KBOROWS
  KSBORWS=KSBORWS+KBOROWS
  RLIBUNQ=NRUNQTI(I,J)
  IF(REGNUNQ.EQ.0) RFGNUNQ=.00001
  NLOANSR=NTRVLBR(K)*RGPRCNT*(RLIBUNQ/REGNUNQ)
  NLOANS=0
  SLIBUNQ=NSUNQTI(I,J)
  DO 95 L=1,NRGIONS
    IF(L.EQ.K) GO TO 95
    REGNUNQ=NTRRUQT(L)
    RGPRCNT=REGNUNQ/STATUNQ
    SREGUNQ=NTRSUQT(L)
    NLOANS=NLOANS+(NTRVLBR(L)*(1.-RGPRCNT)
    X*(SLIBUNQ/(STATUNQ-SREGUNQ)))
95  CONTINUE
    NLOANSX=NLOANSR+NLOANS
    NRLOANS=NRLOANS+NLOANSX
    NSLOANS=NSLOANS+NLOANSX
    KLOANSX=NLOANSX*1.50
    KRLOANS=KRLOANS+KLOANSX
    KSLOANS=KSLOANS+KLOANSX
    KILLONS=KBOROWS+KLOANSX
    KRRILLS(J,K)=KRRILLS(J,K)+KILLONS
    KSILLNS=KSILLNS+KILLONS
    WRITE(6,1040)LIBRARY(I,J),NBOROWS(I,J),KBOROWS,NLOANSX,KLOANSX,
    XKILLONS
    NPRINTS=1
100  CONTINUE
    IF(NPRINTS.EQ.0) GO TO 105
    WRITE(6,1050)NRBORWS,KRBORWS,NRLOANS,KRLOANS,KRRILLS(J,K)
    GO TO 110
105  WRITE(6,1060)
110  CONTINUE
    WRITE(6,1070)NSBORWS,KSBORWS,NSLOANS,KSLOANS,KSILLNS
120  CONTINUE
C
C    CALCULATE STATEWIDE NETWORK INTER-LIBRARY LOANS
C
    WRITE(6,1200)
    DO 160 J=1,NTYPSLB
    WRITE(6,1010)LIBTYPE(J)
    WRITE(6,1015)
    WRITE(6,1020)
    NUMLIBS=NLBTYPE(J)
    NSBORWS=0
    KSBORWS=0
    NSLOANS=0
    KSLOANS=0
    KSILLNS=0
    DO 150 K=1,NRGIONS

```

FIGURE F.3

```

WRITE(6,1030)K
NRBORWS=0
KRBORWS=0
NRLOANS=0
KRLOANS=0
NPRINTS=0
DO 140 I=1,NUMLIBS
  IF(IREGION(I,J).NE.K) GO TO 140
  NRBORWS=NRBORWS+NBOROWS(I,J)
  NSBORWS=NSBORWS+NBOROWS(I,J)
  KBOROWS=NBOROWS(I,J)*4.50
  KRBORWS=KRBORWS+KBOROWS
  KSBORWS=KSBORWS+KBOROWS
  SLIBUNQ=NSUNQTI(I,J)
  STATUNQ=NTSSUQT
  NLOANSX=NTSVLBR*(SLIBUNQ/STATUNQ)
  NRLOANS=NRLOANS+NLOANSX
  NSLOANS=NSLOANS+NLOANSX
  KLOANSX=NLOANSX*1.50
  KRLOANS=KRLOANS+KLOANSX
  KSLOANS=KSLOANS+KLOANSX
  KILLONS=KBOROWS+KLOANSX
  KSRILLS(J,K)=KSRILLS(J,K)+KILLONS
  KSILLNS=KSILLNS+KILLONS
  WRITE(6,1040)LIBRARY(I,J),NBOROWS(I,J),KBOROWS,NLOANSX,KLOANSX,
XKILLONS
  NPRINTS=1
140 CONTINUE
  IF(NPRINTS=EQ.0) GO TO 145
  WRITE(6,1050)NRBORWS,KRBORWS,NRLOANS,KRLOANS,KSRILLS(J,K)
  GO TO 150
145 WRITE(6,1060)
150 CONTINUE
  WRITE(6,1070)NSBORWS,KSBORWS,NSLOANS,KSLOANS,KSILLNS
160 CONTINUE
C
C   SUMMARIZE INTER-LIBRARY LOANS FOR ALL SYSTEMS
C
  WRITE(6,1300)
  DO 180 J=1,NTYPSLB
  WRITE(6,1010)LIBTYPE(J)
  WRITE(6,1310)
  WRITE(6,1320)
  WRITE(6,1330)
  KPSILLS=0
  KRSILLS=0
  KSSILLS=0
  DO 170 K=1,NRGIONS
  WRITE(6,1340)K,KPRILLS(J,K),KRRILLS(J,K),KSRILLS(J,K)
  KPSILLS=KPSILLS+KPRILLS(J,K)
  KRSILLS=KRSILLS+KRRILLS(J,K)
  KSSILLS=KSSILLS+KSRILLS(J,K)
170 CONTINUE
  WRITE(6,1075)KPSILLS,KRSILLS,KSSILLS
180 CONTINUE
  WRITE(6,1350)

```


FIGURE F.3

```
WRITE(6,1310)
WRITE(6,1320)
WRITE(6,1330)
DO 200 K=1,NRGIONS
  KPRILLN=0
  KRRILLN=0
  KSRILLN=0
  DO 190 J=1,NTYPSLB
    KPRILLN=KPRILLN+KPRILLS(J,K)
    KRRILLN=KRRILLN+KRRILLS(J,K)
    KSRILLN=KSRILLN+KSRILLS(J,K)
190 CONTINUE
  WRITE(6,1340)K,KPRILLN,KRRILLN,KSRILLN
  KPSTILL=KPSTILL+KPRILLN
  KRSTILL=KRSTILL+KRRILLN
  KSSTILL=KSSTILL+KSRILLN
200 CONTINUE
  WRITE(6,1075)KPSTILL,KRSTILL,KSSTILL
  RETURN
END
```

FIGURE F.3

```

SUBROUTINE TECHSER
COMMON LIBRARY(100,5),NRUNQTI(100,5),NSUNQTI(100,5)
COMMON IREGION(100,5),NSERVED(100,5),NVOLUMS(100,5)
COMMON NTITLES(100,5),NVOLACQ(100,5),NTITACQ(100,5)
COMMON NBOROWS(100,5)
COMMON LIBTYPE(5),NLBTYPE(5)
COMMON NRGIONS,NTYPSLB
COMMON NTRSERV(15),NTRVOLS(15),NTRTITS(15),NTRVOLA(15)
COMMON NTRTITA(15),NTRRUQT(15),NTRSUQT(15),NTRVLBR(15)
COMMON NTSSERV,NTSVOLS,NTSTITS,NTSVOLA
COMMON NTSTITA,NTSRUQT,NTSSUQT,NTSVLBR
COMMON KPRILLS(5,15),KRRILLS(5,15),KSRILLS(5,15)
COMMON KPRPRCS(5,15),KRRPRCS(5,15),KSRPRCS(5,15)
COMMON KPRLCVL(5,15),KRRLCVL(5,15),KSRLCVL(5,15)
1000 FORMAT(1H,33HPRESENT SYSTEM TECHNICAL SERVICES,///)
1010 FORMAT(1H ,A10,10H LIBRARIES,/)
1015 FORMAT(1H ,20X,10H VOLUMES,10X,10H TITLES,10X,10H TOTAL)
1020 FORMAT(1H ,20X,10H ACQUIRED,10H COST,10H ACQUIRED,
X10H COST,10H COST,/)
1030 FORMAT(1H ,10H REGION,13,/)
1040 FORMAT(1H ,10X,A10,5I10)
1050 FORMAT(1H0,7X,12HREGION TOTAL,1X,2I10,10X,2I10,/)
1060 FORMAT(1H+,7X,12HNO LIBRARIES,/)
1070 FORMAT(1H0,7X,11HSTATE TOTAL,2X,2I10,10X,2I10,////////)
1075 FORMAT(1H0,7X,11HSTATE TOTAL,2X,3I10,////////)
1100 FORMAT(1H1,35HREGIONAL NETWORK TECHNICAL SERVICES,///)
1200 FORMAT(1H1,36HSTATEWIDE NETWORK TECHNICAL SERVICES,///)
1300 FORMAT(1H1,34HTECHNICAL SERVICES FOR ALL SYSTEMS,///)
1310 FORMAT(1H ,30X,10H REGIONAL,10H STATEWIDE)
1320 FORMAT(1H ,20X,10H PRESENT,10H NETWORK,10H NETWORK)
1330 FORMAT(1H ,20X,10H COST,10H COST,10H COST,/)
1340 FORMAT(1H ,10H REGION,13,7X,3I10)
1350 FORMAT(1H ,13HALL LIBRARIES,/)
C
C CALCULATE PRESENT SYSTEM TECHNICAL SERVICES
C
WRITE(6,1000)
DO 20 J=1,NTYPSLB
WRITE(6,1010)LIBTYPE(J)
WRITE(6,1015)
WRITE(6,1020)
NUMLIBS=NLBTYPE(J)
NSVOLAQ=0
KSVOLPR=0
KSTITPR=0
KSPROCS=0
DO 20 K=1,NRGIONS
WRITE(6,1030)K
NRVOLAQ=0
KRVOLPR=0
KRTITPR=0
NPRINTS=0
DO 10 I=1,NUMLIBS
IF(IREGION(I,J).NE.K) GO TO 10
NRVOLAQ=NRVOLAQ+NVOLACQ(I,J)
NSVOLAQ=NSVOLAQ+NVOLACQ(I,J)

```

FIGURE F.3

```

KVOLPRC=NVOLACQ(I,J)*.60
KRVOLPR=KKVOLPR+KVOLPRC
KSVOLPR=KSVOLPR+KVOLPRC
KTITPRC=NTITACQ(I,J)*5.00
KRTITPR=KRTITPR+KTITPRC
KSTITPR=KSTITPR+KTITPRC
KPROCSS=KVOLPRC+KTITPRC
KPRPRCS(J,K)=KPRPRCS(J,K)+KPROCSS
KSPROCS=KSPROCS+KPROCSS
WRITE(6,1040)LIBRARY(I,J),NVOLACQ(I,J),KVOLPRC,NTITACQ(I,J),
XKTITPRC,KPROCSS
NPRINTS=1
10 CONTINUE
IF(NPRINTS=EQ.0) GO TO 15
WRITE(6,1050)NRVOLAQ,KRVOLPR,KRTITPR,KPRPRCS(J,K)
GO TO 20
15 WRITE(6,1060)
20 CONTINUE
WRITE(6,1070)NSVOLAQ,KSVOLPR,KSTITPR,KSPROCS
30 CONTINUE

C
C
C
C
CALCULATE REGIONAL NETWORK TECHNICAL SERVICES

WRITE(6,1100)
DO 120 J=1,NTYPSLB
WRITE(6,1010)LIBTYPE(J)
WRITE(6,1015)
WRITE(6,1020)
NUMLIBS=NLBTYPE(J)
NSVOLAQ=0
KSVOLPR=0
KSTITPR=0
KSPROCS=0
DO 110 K=1,NRGIONS
WRITE(6,1030)K
NRVOLAQ=0
KRVOLPR=0
KRTITPR=0
NPRINTS=0
DO 100 I=1,NUMLIBS
IF(IREGION(I,J).NE.K) GO TO 100
NRVOLAQ=NRVOLAQ+NVOLACQ(I,J)
NSVOLAQ=NSVOLAQ+NVOLACQ(I,J)
KVOLPRC=NVOLACQ(I,J)*.60
KRVOLPR=KRVOLPR+KVOLPRC
KSVOLPR=KSVOLPR+KVOLPRC
REGNUNQ=NTRRUQT(K)
REGNTIT=NTRTITS(K)
IF(REGNTIT.EQ.0) REGNTIT=.00001
KTITPRC=NT9TACQ(I,J)*2.00+(NTITACQ(I,J)*(REGNUNQ/REGNTIT)*3.00)
KRTITPR=KRTITPR+KTITPRC
KSTITPR=KSTITPR+KTITPRC
KPROCSS=KVOLPRC+KTITPRC
KRRPRCS(J,K)=KRRPRCS(J,K)+KPROCSS
KSPROCS=KSPROCS+KPROCSS
WRITE(6,1040)LIBRARY(I,J),NVOLACQ(I,J),KVOLPRC,NTITACQ(I,J),

```

FIGURE F.3

```

XKTI TPRC,KPROCSS
  NPRINTS=1
100 CONTINUE
  IF(NPRINTS.EQ.0) GO TO 105
  WRITE(6,1050)NRVOLAQ,KRVOLPR,KRTITPR,KKRPRCS(J,K)
  GO TO 110
105 WRITE(6,1060)
110 CONTINUE
  WRITE(6,1070)NSVOLAQ,KSVOLPR,KSTITPR,KSPROCS
120 CONTINUE
C
C   CALCULATE STATEWIDE NETWORK TECHNICAL SERVICES
C
  WRITE(6,1200)
  DO 200 J=1,NTYPSLB
  WRITE(6,1010)LIBTYPE(J)
  WRITE(6,1015)
  WRITE(6,1020)
  NUMLIBS=NL2TYPE(J)
  NSVOLAQ=0
  KSVOLPR=0
  KSTITPR=0
  KSPROCS=0
  DO 190 K=1,NRGIONS
  WRITE(6,1030)K
  NRVOLAQ=0
  KRVOLPR=0
  KRTITPR=0
  NPRINTS=0
  DO 180 I=1,NUMLIBS
  IF(IREGION(I,J).NE.K) GO TO 180
  NRVOLAQ=NRVOLAQ+NVOLACQ(I,J)
  NSVOLAQ=NSVOLAQ+NVOLACQ(I,J)
  KVOLPRC=NVOLACQ(I,J)*.60
  KRVOLPR=KRVOLPR+KVOLPRC
  KSVOLPR=KSVOLPR+KVOLPRC
  STATUNQ=NTSSUQT
  STATIT=NTSTIT
  KTITPRC=NTITACQ(I,J)*2.00+(NTITACQ(I,J)*(STATUNQ/STATIT)*3.00)
  KRTITPR=KRTITPR+KTITPRC
  KSTITPR=KSTITPR+KTITPRC
  KPROCSS=KVOLPRC+KTITPRC
  KSRPRCS(J,K)=KSRPRCS(J,K)+KPROCSS
  KSPROCS=KSPROCS+KPROCSS
  WRITE(6,1040)LIBRARY(I,J),NVOLACQ(I,J),KVOLPRC,NTITACQ(I,J),
XKTI TPRC,KPROCSS
  NPRINTS=1
180 CONTINUE
  IF(NPRINTS.EQ.0) GO TO 185
  WRITE(6,1050)NRVOLAQ,KRVOLPR,KRTITPR,KSRPRCS(J,K)
  GO TO 190
185 WRITE(6,1060)
190 CONTINUE
  WRITE(6,1070)NSVOLAQ,KSVOLPR,KSTITPR,KSPROCS
200 CONTINUE

```

FIGURE F.3

```

C      SUMMARIZE TECHNICAL SERVICES FOR ALL SYSTEMS
C
      WRITE(6,1300)
      DO 220 J=1,NTYPSLB
      WRITE(6,1010)LIBTYPE(J)
      WRITE(6,1310)
      WRITE(6,1320)
      WRITE(6,1330)
      KPSPRCS=0
      KRSPRCS=0
      KSSPRCS=0
      DO 210 K=1,NRGIONS
      WRITE(6,1340)K,KPRPRCS(J,K),KRRPRCS(J,K),KSRPRCS(J,K)
      KPSPRCS=KPSPRCS+KPRPRCS(J,K)
      KRSPRCS=KRSPRCS+KRRPRCS(J,K)
      KSSPRCS=KSSPRCS+KSRPRCS(J,K)
210  CONTINUE
      WRITE(6,1075)KPSPRCS,KRSPRCS,KSSPRCS
220  CONTINUE
      WRITE(6,1350)
      WRITE(6,1310)
      WRITE(6,1320)
      WRITE(6,1330)
      DO 240 K=1,NRGIONS
      KPRPROC=0
      KRRPROC=0
      KSRPROC=0
      DO 230 J=1,NTYPSLB
      KPRPROC=KPRPROC+KPRPRCS(J,K)
      KRRPROC=KRRPROC+KRRPRCS(J,K)
      KSRPROC=KSRPROC+KSRPRCS(J,K)
230  CONTINUE
      WRITE(6,1340)K,KPRPROC,KRRPROC,KSRPROC
      KPSTPRC=KPSTPRC+KPRPROC
      KRSTPRC=KRSTPRC+KRRPROC
      KSSTPRC=KSSTPRC+KSRPROC
240  CONTINUE
      WRITE(6,1075)KPSTPRC,KRSTPRC,KSSTPRC
      RETURN
      END

```

FIGURE F.3

```

SUBROUTINE COLMGMT
COMMON LIBRARY(100,5),NRUNQTI(100,5),NSUNQTI(100,5)
COMMON IREGION(100,5),NSERVED(100,5),NVOLUMS(100,5)
COMMON NTITLES(100,5),NVOLACQ(100,5),NTITACQ(100,5)
COMMON NBOROWS(100,5)
COMMON LIBTYPE(5),NLRTYPE(5)
COMMON NRGIONS,NTYPSLB
COMMON NTRSERV(15),NTRVOLS(15),NTRTITS(15),NTRVOLA(15)
COMMON NTRKITA(15),NTRRUQT(15),NTRSUQT(15),NTRVLBR(15)
COMMON NTSSERV,NTSVOLS,NTSTITs,NTSVOLA
COMMON NTSTITA,NTSRUQT,NTSSUQT,NTSVLBR
COMMON KPRILLS(5,15),KRRILLS(5,15),KSRILLS(5,15)
COMMON KPRPRCS(5,15),KRRPRCS(5,15),KSRPRCS(5,15)
COMMON KPRLCVL(5,15),KRRLCVL(5,15),KSRLCVL(5,15)
1000 FORMAT(1H,36HPRESENT SYSTEM COLLECTION MANAGEMENT,///)
1010 FORMAT(1H ,A10,10H LIBRARIES,/)
1015 FORMAT(1H ,20X,10H LOW CIRC.)
1020 FORMAT(1H ,20X,10H  VOLUMES,10H      COST,/)
1030 FORMAT(1H ,10H  REGION,I3,/)
1040 FORMAT(1H ,10X,A10,2I10)
1050 FORMAT(1H0,7X,12HREGION TOTAL,1X,2I10,/)
1060 FORMAT(1H+,7X,12HNO LIBRARIES,/)
1070 FORMAT(1H0,7X,11HSTATE TOTAL,2X,2I10,////////)
1075 FORMAT(1H0,7X,11HSTATE TOTAL,2X,3I10,////////)
1100 FORMAT(1H1,36HREGIONAL NETWORK COLLECTION MANAGEMENT,///)
1200 FORMAT(1H1,39HSTATEWIDE NETWORK COLLECTION MANAGEMENT,///)
1300 FORMAT(1H1,37HCOLLECTION MANAGEMENT FOR ALL SYSTEMS,///)
1310 FORMAT(1H ,30X,10H  REGIONAL,10H STATEWIDE)
1320 FORMAT(1H ,20X,10H  PRESENT,10H  NETWORK,10H  NETWORK)
1330 FORMAT(1H ,20X,10H      COST,10H      COST,10H      COST,/)
1340 FORMAT(1H ,10H  REGION,I3,7X,3I10)
1350 FORMAT(1H ,13HALL LIBRARIES,/)

C
C  CALCULATE PRESENT SYSTEM COLLECTION MANAGEMENT
C
WRITE(6,1000)
DO 30 J=1,NTYPSLB
WRITE(6,1010)LIBTYPE(J)
WRITE(6,1015)
WRITE(6,1020)
NUMLIBS=NLBTYPE(J)
NSLCVOL=0
KSLCVOL=0
DO 20 K=1,NRGIONS
WRITE(6,1030)K
NRLCVOL=0
NPRINTS=0
DO 10 I=1,NUMLIBS
IF(IREGION(I,J).NE.K) GO TO 10
NLCVOLM=NTITLES(I,J)*.50
NRLCVOL=NRLCVOL+NLCVOLM
NSLCVOL=NSLCVOL+NLCVOLM
KLCVOLM=NLCVOLM*.20
KPRLCVL(J,K)=KPRLCVL(J,K)+KLCVOLM
KSLCVOL=KSLCVOL+KLCVOLM
WRITE(6,1040)LIBRARY(I,J),NLCVOLM,KLCVOLM

```

FIGURE F.3

```

NPRINTS=1
10 CONTINUE
   IF(NPRINTS.EQ.0) GO TO 15
   WRITE(6,1050)NRLCVOL,KPRLCVL(J,K)
   GO TO 20
15 WRITE(6,1060)
20 CONTINUE
   WRITE(6,1070)NSLCVOL,KSLCVOL
30 CONTINUE

C
C   CALCULATE REGIONAL NETWORK COLLECTION MANAGEMENT
C

WRITE(6,1100)
DO 120 J=1,NTYPSLB
WRITE(6,1010)LIBTYPE(J)
WRITE(6,1015)
WRITE(6,1020)
NUMLIBS=NLBTYPE(J)
NSLCVOL=0
KSLCVOL=0
DO 110 K=1,NRGIONS
WRITE(6,1030)K
NRLCVOL=0
NPRINTS=0
DO 100 I=1,NUMLIBS
IF(IREGION(I,J).NE.K) GO TO 100
NLCVOLM=NRUNQT1(I,J)*.50
NRLCVOL=NRLCVOL+NLCVOLM
NSLCVOL=NSLCVOL+NLCVOLM
KLCVOLM=NLCVOLM*.20
KRRLCVL(J,K)=KRRLCVL(J,K)+KLCVOLM
KSLCVOL=KSLCVOL+KLCVOLM
WRITE(6,1040)LIBRARY(I,J),NLCVOLM,KLCVOLM
NPRINTS=1
100 CONTINUE
   IF(NPRINTS.EQ.0) GO TO 105
   WRITE(6,1050)NRLCVOL,KRRLCVL(J,K)
   GO TO 110
105 WRITE(6,1060)
110 CONTINUE
   WRITE(6,1070)NSLCVOL,KSLCVOL
120 CONTINUE

C
C   CALCULATE STATEWIDE NETWORK COLLECTION MANAGEMENT
C

WRITE(6,1200)
DO 200 J=1,NTYPSLB
WRITE(6,1010)LIBTYPE(J)
WRITE(6,1015)
WRITE(6,1020)
NUMLIBS=NLBTYPE(J)
NSLCVOL=0
KSLCVOL=0
DO 190 K=1,NRGIONS
WRITE(6,1030)K
NRLCVOL=0

```

FIGURE F.3

```

NPRINTS=0
DO 180 I=1,NUMLIRS
  IF (IREGION(I,J).NE.K) GO TO 180
  NLCVOLM=NSUNQTI(I,J)*.50
  NRLCVOL=NRLCVOL+NLCVOLM
  NSLCVOL=NSLCVOL+NLCVOLM
  KLCVOLM=NLCVOLM*.20
  KSRLCVL(J,K)=KSRLCVL(J,K)+KLCVOLM
  KSLCVOL=KSLCVOL+KLCVOLM
  WRITE(6,1040)LIBRARY(I,J),NLCVOLM,KLCVOLM
  NPRINTS=1
180 CONTINUE
  IF(NPRINTS.EQ.0) GO TO 185
  WRITE(6,1050)NRLCVOL,KSRLCVL(J,K)
  GO TO 190
185 WRITE(6,1060)
190 CONTINUE
  WRITE(6,1070)NSLCVOL,KSLCVOL
200 CONTINUE

C
C   SUMMARIZE COLLECTION MANAGEMENT FOR ALL SYSTEMS
C

  WRITE(6,1300)
  DO 220 J=1,NTYPSLB
    WRITE(6,1010)LIBTYPE(J)
    WRITE(6,1310)
    WRITE(6,1320)
    WRITE(6,1330)
    KPSLCVL=0
    KRSLCVL=0
    KSSLCVL=0
    DO 210 K=1,NRGIONS
      WRITE(6,1340)K,KPRLCVL(J,K),KRRLCVL(J,K),KSRLCVL(J,K)
      KPSLCVL=KPSLCVL+KPRLCVL(J,K)
      KRSLCVL=KRSLCVL+KRRLCVL(J,K)
      KSSLCVL=KSSLCVL+KSRLCVL(J,K)
210 CONTINUE
      WRITE(6,1075)KPSLCVL,KRSLCVL,KSSLCVL
220 CONTINUE
      WRITE(6,1350)
      WRITE(6,1310)
      WRITE(6,1320)
      WRITE(6,1330)
      DO 240 K=1,NRGIONS
        KPRLWCV=0
        KRRLWCV=0
        KSRLWCV=0
        DO 230 J=1,NTYPSLB
          KPRLWCV=KPRLWCV+KPRLCVL(J,K)
          KRRLWCV=KRRLWCV+KRRLCVL(J,K)
          KSRLWCV=KSRLWCV+KSRLCVL(J,K)
230 CONTINUE
          WRITE(6,1340)K,KPRLWCV,KRRLWCV,KSRLWCV
          KPSTLCV=KPSTLCV+KPRLWCV
          KRSTLCV=KRSTLCV+KRRLWCV
          KSSTLCV=KSSTLCV+KSRLWCV

```


FIGURE F.3
240 CONTINUE
WRITE(6,1075)KPSTLCV,KRSTLCV,KSSTLCV
RETURN
END

APPENDIX G
MODELING, ESTIMATION, AND PREDICTION
USES OF REGRESSION ANALYSIS IN LIBRARY RESEARCH

The use of quantitative techniques for network planning is not new, but particular methods widely utilized in other disciplines are virtually unknown to the library profession. This Appendix illustrates the method of multiple regression analysis as applied to modeling, estimation, and prediction of systems important in library planning.

Regression analysis requires three inputs:

1. A model or a set of alternative models.
2. Data corresponding to the variables included in the model(s).
3. Computational facilities to carry out the estimation of the parameter in the model(s).

Since library researchers have no body of generally accepted theory upon which to rely, the models utilized must of necessity be fairly ad hoc. This should not disqualify their usefulness, for the main purpose of regression analysis here is to establish stable empirical relationships among variables that can be observed and/or manipulated.

Data availability often presents a problem because many libraries do not collect the necessary data or do not collect data which are comparable with those collected by other libraries. Regression results are only as valid as the data used in estimation. However, the aim is to establish average relationships for all libraries. Therefore, one-hundred percent accuracy in the model's parameter estimates need not be the goal of the investigator.

Once the model(s) has been specified and the data collected, the process of multiple regression estimations is attempted. In most cases a ready-made computer program can easily handle the estimation procedure. Although this phase of research can be done on a desk calculator, it is recommended that the researcher obtain use of a high-speed computer. Hand computation is extremely time consuming and the possibility for error is great.

In what follows, selected results from working papers are presented in order to illustrate the possibilities for quantitative analysis using multiple regression.

Readers wishing to pursue the technical aspects of regression are referred to J. Johnston, Econometric Methods, McGraw-Hill, New York, 1963 and P. Rao and R. L. Miller, Applied Econometrics, Wadsworth Publishing Company, Belmont (March, 1971).

G.1 Determinants of Multiple-Copy Ordering

For proper evaluation of possible benefits and costs arising from network book processing, it may be necessary to estimate the degree of multiple-copy ordering in the library system. One obvious, but costly, procedure would involve extensive sampling of all the libraries to be involved in the network.

Another approach is to gather data from a sample of libraries and analyze this using the multiple regression technique. The data gathered for use in this project consisted of information on the degree of individual library duplicate ordering and other pertinent characteristics. It should be noted that these data are cross-section for the year 1968.

G.1.1 Theory

It is perhaps futile to embark upon a theory of multiple-book ordering. All that can sensibly be offered is some common-sense ad hockery.

The main determinants of duplicate ordering would seem to be the relative size of the library and concomitantly the size of the population served. Presumably, large libraries require more than one copy of certain books, especially best sellers, in order to keep the queuing time below what they consider an acceptable upper limit.

A priori, then, the following assumptions are made:

$$\text{Assumption 1: } \frac{\partial (VA/TAD)}{\partial \text{VOLUMS}} > 0$$

$$\text{Assumption 2: } \frac{\partial (VA/TAD)}{\partial \text{POP}} > 0$$

where VA = Volumes added
TAD = Titles added
POP = Population served
VOLUMS = Total book stock as measured by
number of volumes in library.

Assumption 1 is that the degree of multiple-copy ordering will increase as the size of the library increases, holding all other things constant. Assumption 2 is that the degree of multiple-copy ordering will increase as the population served increases, holding other things constant.

Population served may not, though, give a true picture of patronage utilization. A large population could demand very little from the local library whereas the converse could be true for a library serving a relatively small population. Utilization can be measured quite well by circulation per capita (CIRCPG).

A priori, then:

$$\text{Assumption 3: } \frac{\partial (VA/TAD)}{\partial CIRCPC} > 0$$

Assumption 3 is that the degree of multiple-copy ordering increases as circulation per capita increases, cet. par.

G.1.2 Empirical Results--Simple Correlations

In an attempt to assess the validity of the above assumptions, the approach is to examine the zero-order sample correlations. The critical value of r is 0.3783 at the 90 percent level of confidence and 0.5614 at the 99 percent level. (These are obtained from Fisher's Z transformation.)

While recognizing the weaknesses in using simple correlations, because they do not take into account complex relationships among the variables, the data can be considered to have not contradicted assumptions 1 and 2, for:

$$\begin{aligned} r(VA/TAD, VOLUMS) &= 0.63741 \\ r(VA/TAD, POP) &= 0.76227 \end{aligned}$$

Both these simple correlations are significant at the 1% level.

Assumption 3 contradicts the data in our sample, for:

$$r(VA/TAD, CIRCPC) = -0.0058$$

Although r is negative, it is almost zero, indicating no association rather than inverse association.

Some empirical associations that were not suggested in the theory but exist in the data may be given here:

$$\begin{aligned} r(VA/TAD, VOLADD) &= 0.89154 \\ r(VA/TAD, PCNTVA) &= 0.64458 \end{aligned}$$

The first one indicates that there is an association in the data between the absolute magnitude of increases in book stock and the degree of multiple-copy ordering. This positive relationship holds also for variations in additions as a percent of existing book stock (PCNTVA).

G.1.3 Empirical Results--Multiple Regression Analysis

A more fruitful approach to the study of the determinants of multiple-copy ordering involves the estimation of more complex relationships. Thus regression analysis is appropriate. The functional form of the relation is first considered.

THE MODEL

One possible function form, multiplicative will be considered. In consideration of the theory from G.1.1 above, the following possible model can be posited.

$$VA/TAD = A(VOLUMS)^{\alpha}(CIRCPC)^{\beta} e^{\epsilon}$$

where A, α , and β , are parameters to be estimated and e is a log normally distributed disturbance term. Using least squares estimation we obtain:

$$\log VA/TAD = -0.6115 + 0.5701 \log VOLUMS + 0.3668 \log CIRCPC$$

(-4.6) (6.18) (2.41)

$$R^2 = 0.6954 \qquad F = 19.402$$

The results of the model indicate that if the size of the library is increased by 1%, a $\frac{1}{2}\%$ increase in multiple-copy ordering results, and a 1% change in circulation per capita will cause a $\frac{1}{3}\%$ change in multiple-copy ordering.

G.2 Determinants of Library Utilization

The degree of library utilization, that is, the demand for library services, is a crucial variable in making decisions as to the benefits received from particular expenditures on libraries. Moreover, one might wish to predict the future changes in library utilization. To this end a model is needed and estimates of relevant parameters must be made.

G.2.1. Theory

The demand for library services should, of course, be a function of the price paid. Since libraries do not operate via the usual market mechanism, there is no readily available price index to be used in estimation. A proxy for price, which is the reciprocal of availability as measured by total book stock is used here.

For this section, circulation per capita (CIRCPC) is considered as one measure of library utilization (demand). Besides price, it could be expected that quality of service is positively related to CIRCPC. There are three possible measures of "quality" of service:

1. Operating expenditures per capita (OEXPPC): this figure represents the outlay for staff salaries, purchase of new books, rebinding, etc. (Direct expenses.)
2. Materials expenditure per capita (MEXPPC): This figure represents outlays for buildings and equipment. (Indirect expenses.)
3. Materials expenditure as a percent of operating expenditure (MAT/OP): this figure represents the proportion of money

spent on indirect as opposed to direct library services.

Another aspect of "quality" concerns the "newness" of the available collection. Presumably demand will increase as more new materials are added to the library. Thus volumes added (VOLADD) or perhaps volumes added as a percent of total volumes (PCNTVA) should be positively related to CIRCPC.

Lastly, the tastes of the community must be taken into account. One hypothesis might be that urban residents have tastes which include more reading than rural residents. Thus more populated areas should demand, cet. par., more library services. Total population (POP) will be the proxy for the urban-rural taste variable.

To summarize the above discussion symbolically:

$$\begin{aligned}
 (1) \quad & \frac{\partial \text{CIRCPC}}{\partial \text{PRICE}} < 0 \\
 (2) \quad & \frac{\partial \text{CIRCPC}}{\partial \text{OEXPPC}} > 0 \\
 (3) \quad & \frac{\partial \text{CIRCPC}}{\partial \text{MEXPPC}} > 0 \\
 (4) \quad & \frac{\partial \text{CIRCPC}}{\partial (\text{MEX/OP})} \leq \frac{\partial \text{CIRCPC}}{\partial \text{POP}} \\
 (5) \quad & \frac{\partial \text{CIRCPC}}{\partial \text{VOLADD}} > 0 \\
 (6) \quad & \frac{\partial \text{CIRCPC}}{\partial \text{PCNTVA}} > 0 \\
 (7) \quad & \frac{\partial \text{CIRCPC}}{\partial \text{POP}} > 0
 \end{aligned}$$

G.2.2 The Model

For the purpose of estimation and prediction two functional forms are posited, a linear model and a multiplicative model (which is linear in its logarithms).

Model I:

$$\begin{aligned}
 \text{CIRCPC} = & \beta_0 + \beta_1 \text{POP} + \beta_2 \text{PRICE} + \beta_3 \text{OEXPPC} \\
 & + \beta_4 \text{MEXPPC} + \beta_5 \text{VOLADD} + \epsilon_I
 \end{aligned}$$

Model II:

$$\text{CIRCPC} = \beta_0 (\text{POP})^{\beta_1} (\text{PRICE})^{\beta_2} (\text{OEXPPC})^{\beta_3} (\text{MEXPPC})^{\beta_4} (\text{VOLADD})^{\beta_5} \epsilon_{II}$$

The β 's and ϵ_I 's are the parameters to be estimated and ϵ_I is assumed randomly distributed as $N(0, \sigma^2)$ and $\ln \epsilon_{II}$ is assumed randomly distributed as $N(0, \sigma^2)$.

G.2.3 Empirical Results: Multiple Regression

Stepwise regression was used to fit the model. Ordinary least squares estimation was utilized despite some obvious simultaneity problems.

Model Ia:

$$\begin{aligned} \text{CIRCPC} = & 3.405 - 0.0000106 \text{ POP} - 24032.0 \text{ PRICE} + 0.827 \text{ OEXPPC} \\ & (2.592) \quad (-1.667) \quad (-0.344) \quad (2.397) \\ & + 0.863 \text{ MEXPPC} + 0.00005 \text{ VOLADD} \\ & (0.328) \quad (1.4214) \\ \bar{R}^2 = & .4813 \quad \text{d.f.} = 14 \end{aligned}$$

Model IIa:

$$\begin{aligned} \ln \text{CIRCPC} = & 2.002 - 0.662 \ln \text{POP} - 0.6247 \ln \text{PRICE} \\ & (2.406) \quad (3.1917) \quad (-2.708) \\ & + 0.425 \ln \text{OEXPPC} - 0.2908 \ln \text{MEXPPC} + 0.312 \ln \text{VOLADD} \\ & (1.945) \quad (-1.215) \quad (1.406) \\ \bar{R}^2 = & 0.6714 \quad \text{d.f.} = 14 \end{aligned}$$

Some interesting results can be seen above. First, the coefficient of POP and of $\ln \text{POP}$ is negative and even significantly negative. This indicates that the hypothesis about a rural population being less interested in reading might be unsubstantiated by the data.

In model Ia the other coefficients were of the anticipated signs but those of MEXPPC and VOLADD were not significant. Model IIa yielded similar results with an insignificant coefficient of $\ln \text{MEXPPC}$. Note that although the \bar{R}^2 (goodness of fit corrected for degrees of freedom) is higher in Model IIa, these measures are noncomparable because the dependent variables are not the same in Models Ia and IIa.

Since the theory is not unambiguous, the data indicates that MEXPPC is a superfluous variable.

Re-estimating the equations without MEXPPC and $\ln \text{MEXPPC}$ yields:
Model Ib:

$$\begin{aligned} \text{CIRCPC} = & 4.249 - 0.0000197 \text{ POP} - 26741.0 \text{ PRICE} + 0.6877 \text{ OEXPPC} \\ & (3.811) \quad (-1.988) \quad (-1.1638) \quad (2.4520) \\ & + 0.000064 \text{ VOLADD} \\ & (1.842) \\ \bar{R}^2 = & 0.5503 \quad \text{d.f.} = 15 \end{aligned}$$

Model IIb:

$$\begin{aligned} \ln \text{CIRCPC} = & 1.938 - 0.6199 \ln \text{POP} = 0.5761 \ln \text{PRICE} \\ & (2.298) \quad (-2.963) \quad \quad \quad (-1.783) \\ & + 0.2524 \ln \text{OEXPPC} + 0.238 \ln \text{VOLADD} \\ & \quad \quad (1.497) \\ \bar{R}^2 = & 0.5610 \quad \quad \quad \text{d.f.} = 15 \end{aligned}$$

Since the remaining coefficient estimates did not change much, and the \bar{R}^2 's remained about the same, MEXPPC and $\ln \text{MEXPPC}$ are superfluous.

In an attempt to obtain the best predictor of CIRCPC and $\ln \text{CIRCPC}$, VOLADD and $\ln \text{VOLADD}$ are eliminated with the following results:

Model Ic:

$$\begin{aligned} \text{CIRCPC} = & 3.357 - 0.00001 \text{POP} - 2.7041 \text{PRICE} \\ & (4.101) \quad (-1.864) \quad \quad \quad (-1.041) \\ & + 0.9116 \text{OEXPPC} \\ & \quad \quad (4.412) \\ \bar{R}^2 = & 0.5761 \quad \quad \quad \text{d.f.} = 16 \end{aligned}$$

Model IIc:

$$\begin{aligned} \ln \text{CIRCPC} = & 1.250 - 0.4658 \ln \text{POP} - 0.4586 \ln \text{PRICE} \\ & (2.197) \quad (-2.927) \quad \quad \quad (-2.566) \\ & + 0.2690 \ln \text{OEXPPC} \\ & \quad \quad (1.591) \\ \bar{R}^2 = & 0.6565 \quad \quad \quad \text{d.f.} = 16 \end{aligned}$$

From the multiple regression results it can be concluded that more populated areas do not utilize (on a per capita basis) libraries more than less populated areas.

Also, availability does determine to some extent the degree of utilization as does the expenditures on direct services.

G.3 Determinants of Total Library Circulation

In the previous example the determinants of library utilization as measured by circulation per capita were examined. It was found that the most efficient prediction model included population, price, and operating expenditures per capita. In this example the determinants of total circulation are examined.

G.3.1 Theory

As before, this hypothesis is that demand is a function of price, quality of services, and tastes. Price is measured by the reciprocal of total book stock. Total book stock is a proxy for availability. The quality of service is measured by direct expenses (operating) and the ratio of indirect (materials) to direct expenditures. Also the number of volumes added may be an indicator of quality.

Again population will be used as a proxy for taste. For determining circulation per capita, the coefficient of population was negative, indicating higher utilization rates in rural areas. For total circulation this negative relationship should not exist because, as is obvious, more populated areas have larger libraries and also larger circulation.

G.3.2 The Model

For simplicity, results from only a log linear demand function will be presented:

$$(1) \log TCIRC = \beta_0 + \beta_1 \log PRICE + \sum_{i=2}^k \beta_i \log QUALITY + \beta_{k+1} \log TASTE + \epsilon$$

is assumed log-normally distributed with mean zero and constant variance. In the empirical section below, the results of different measures of quality are presented.

G.3.3 Empirical Results: Multiple Regression

Model I:

$$\begin{aligned} \log TCIRC = & 2.024 - 0.718 \log PRICE + 0.335 \log PCNTVA \\ & (2.479) \quad (-4.329) \quad (1.618) \\ & -0.375 \log MAT/OP + 0.247 \log POP \\ & (-1.848) \quad (1.550) \end{aligned}$$

$$R^2 = .973 \quad \bar{R}^2 = .966 \quad d.f. = 15$$

As hypothesized, the coefficient of log PRICE was negative and it was significant. The negative coefficient of log MAT/OP indicates that ceteris paribus, when more of a fixed budget is spent on direct services, there is higher circulation. The direction of causation may of course be argued to be the other way.)

The fit of the equation to the data was very good as evidenced by an \bar{R}^2 in excess of .9. It will be hard to improve the predictive powers of Model I. But it may be interesting to see the effects of other measures of quality and also to see if fewer variables will yield a usable prediction model.

Leaving out log POP:

Model II

$$\begin{aligned} \log \text{TCIRC} = & 2.609 - 0.962 \log \text{PRICE} + 0.534 \log \text{PCNTVA} \\ & (3.453) \quad (-18.293) \quad (3.580) \\ & -0.321 \log \text{MAT/OP} \\ & (-1.541) \end{aligned}$$

$$R^2 = 0.969 \quad \bar{R}^2 = 0.963 \quad \text{d.f.} = 16$$

Notice that the coefficient of price is now almost unity. That is, the demand for TCIRC has unitary price elasticity. The \bar{R}^2 did not change much when log POP was dropped from the regression.

G.4 Book Processing--Prediction of Volumes and Titles Added

In order to predict the cost savings due to network-wide central book processing schemes, it might be necessary to predict future levels of book ordering. To this end, several prediction models are examined here.

G.4.1 Theory

It can be reasonably assumed that book ordering (volumes added = VOLADD) is a function of the size of the library, as measured by total number of volumes (VOLUMS) and the size of the patronage (POP). Hence, in straight linear form:

$$(1) \text{VOLADD} = \beta_0 + \beta_1 \text{VOLUMS} + \beta_2 \text{POP} + \epsilon_1$$

and in multiplicative form

$$(2) \text{VOLADD} = \beta_0 (\text{VOLUMS})^{\beta_1} (\text{POP})^{\beta_2} e^{\epsilon_2}$$

Total circulation or circulation per capita is expected to influence book additions also. It could be posited, for example:

$$(3) \text{VOLADD} = \gamma_0 + \gamma_1 \text{POP} + \gamma_2 \text{CIRC} + \epsilon_3$$

or

$$(4) \text{VOLADD} = \gamma_0 (\text{POP})^{\gamma_1} (\text{CIRC})^{\gamma_2} e^{\epsilon_4}$$

If a library finds itself requesting more interlibrary loans (ILL) we can hypothesize that it will order more books in an attempt to satisfy patrons with shorter average response times:

$$(5) \text{VOLADD} = \delta_0 + \delta_1 \text{VOL} + \delta_2 \text{ILL} + \epsilon_5$$

and also multiplicatively

$$(6) \text{VOLADD} = \delta_0 \text{VOL}^{\delta_1} \text{ILL}^{\delta_2} e^{\epsilon_5}$$

G.4.2 Regression Results

Using data from 88 libraries in 1967, the following parameter estimates and statistical fits were obtained:

$$(1.1) \text{ VOLADD} = 325.48 - 0.0042 \text{ VOL} + .1389 \text{ POP} \\ (0.996) \quad (-0.649) \quad (10.858)$$

$$R^2 = .940 \quad \bar{R}^2 = .938 \quad \text{d.f.} = 85$$

$$(2.1) \ln \text{VOLADD} = -3.286 + 0.8174 \ln \text{VOL} + 0.253 \ln \text{POP} \\ (-6.083) \quad (5.756) \quad (2.253)$$

$$R^2 = .908 \quad \bar{R}^2 = .906 \quad \text{d.f.} = 85$$

$$(3.1) \text{VOLADD} = -346.836 + 0.13117 \text{ POP} + 90.451 \text{ CIRC} \\ (-0.5003) \quad (36.679) \quad (1.0696)$$

$$R^2 = 0.9406 \quad \bar{R}^2 = 0.939 \quad \text{d.f.} = 85$$

$$(4.1) \ln \text{VOLADD} = -1.42066 + 0.184 \ln \text{POP} + 0.648 \ln \text{CIRC} \\ (-5.805) \quad (2.350) \quad (9.334)$$

$$R^2 = 0.9370 \quad \bar{R}^2 = 0.93551 \quad \text{d.f.} = 85$$

$$(5.1) \text{VOLADD} = -18.196 + 0.0612 \text{ VOL} + 3.040 \text{ ILL} \\ (-0.034) \quad (10.853) \quad (2.118)$$

$$R^2 = 0.8642 \quad \bar{R}^2 = 0.8611 \quad \text{d.f.} = 85$$

$$(6.1) \ln \text{VOLADD} = -4.057 + 1.113 \ln \text{VOL} + 0.0128 \ln \text{ILL} \\ (-9.3298) \quad (22.543) \quad (0.404)$$

$$R^2 = 0.9029 \quad \bar{R}^2 = 0.9006 \quad \text{d.f.} = 85$$

G.4.3 Titles Added

One possible method of obtaining predictions of volumes added and titles added is to combine one of the prediction equations above with the regression results for multiple-copy ordering. (G.1.3 above.) Another approach is to use duplication factors and predict titles added directly. Using the same data as before, but deflating VOLADD by a duplication factor, the following prediction equations for titles added (TITLADD) were obtained:

$$(1.2) \text{ TITLADD} = 1256.92 + 0.0052 \text{ VOL} + 0.0186 \text{ POP} \\ (5.722) \quad (1.181) \quad (2.159)$$

$$R^2 = 0.6214 \quad \bar{R}^2 = 0.6125$$

$$(2.2) \ln \text{ TITLADD} = -1.301 + 0.6328 \ln \text{ VOL} + 0.214 \ln \text{ POP} \\ (-2.015) \quad (3.726) \quad (1.594)$$

$$R^2 = 0.8135 \quad \bar{R}^2 = 0.8092$$

$$(3.2) \text{ TITLADD} = 1273.4 + 0.024 \text{ POP} + 0.00066 \text{ CIRC} \\ (5.76) \quad (1.758) \quad (0.3115)$$

$$R^2 = 0.61566 \quad \bar{R}^2 = 0.6066$$

$$(4.2) \ln \text{ TITLADD} = -0.107 - 0.053 \ln \text{ POP} + 0.703 \ln \text{ CIRC} \\ (-0.397) \quad (-0.616) \quad (9.1601)$$

$$R^2 = 0.8908 \quad \bar{R}^2 = 0.8883$$

$$(5.2) \text{ TITLADD} = 1170.32 + 0.0132 \text{ VOL} + 1.1591 \text{ ILL} \\ (237.810) \quad (9.545) \quad (1.794)$$

$$R^2 = 0.615 \quad \bar{R}^2 = 0.6062$$

$$(6.2) \ln \text{ TITLADD} = -1.950 + 0.883 \ln \text{ VOL} + 0.017 \ln \text{ ILL} \\ (-3.802) \quad (15.150) \quad (0.3129)$$

$$R^2 = 0.808 \quad \bar{R}^2 = 0.804$$

G.5 Demand for Interlibrary Loans (1969 Data)

To assess the effectiveness of possible network configurations it will be necessary to use some interlibrary loan (ILL) figures. Several different approaches are possible. One would be to use the latest data available from the Library News Bulletin. Another is to use multiple regression to formulate a fixed prediction equation. This section presents the results of regression analysis for this purpose.

G.5.1 Regression Results

Using the model which relates interlibrary loan demand to population and size of library, multiple regression results are:

$$(1) \text{ ILL} = 120.642 - 0.00602 \text{ VOL} + 0.01696 \text{ POP} \\ (2.1915) \quad (-6.732) \quad (9.507)$$

$$R^2 = 0.7158 \quad \bar{R}^2 = 0.70719 \quad \text{d.f.} = 66$$

G.6 Determination of Collection Size by Subject Classification.

It is a widely observed phenomenon that small libraries usually hold a different type of collection than large libraries. The question to be asked is whether there exists a stable relationship between library size and the subject makeup of the collection. This section makes an initial attempt at answering this question.

G.6.1 Model and Data Used

A very simple linear model is postulated:

$$(1) \text{ SUB}_i \% = \beta_0 + \beta_1 \text{ VOL} + \beta_2 D + \epsilon$$

where:

SUB % = the percentage of the library's book stock that consists of subject i.

VOL = total volumes in library

D = a dummy variable that takes on the values:

1 if a 4 year college

0 otherwise

The data are taken from this project's June, 1970 Interim Report and the subjects are the major groups of the Dewey Decimal System, i.e. 100's, 200's, etc.

G.6.2 Regression Results

$$(1) \text{ 000's} = 0.9234 + 0.0000011 \text{ VOL} + 0.631 D$$

$$(5.488) \quad (2.845) \quad (1.651)$$

$$R^2 = 0.396 \quad \text{d.f.} = 15$$

$$(2) \text{ 100's} = 1.851 + 0.0000007 \text{ VOL} + 3.9591 D$$

$$(10.323) \quad (1.803) \quad (9.715)$$

$$R^2 = 0.863 \quad \text{d.f.} = 15$$

$$(3) \text{ 200's} = 2.513 + 0.0000003 \text{ VOL} - 0.142 D$$

$$(14.348) \quad (0.649) \quad (-0.357)$$

$$R^2 = 0.039 \quad \text{d.f.} = 15$$

$$(4) \text{ 300's} = 9.582 + 0.0000043 \text{ VOL} + 18.529 D$$

$$(12.119) \quad (2.433) \quad (10.3099)$$

$$R^2 = 0.878 \quad \text{d.f.} = 15$$

$$(5) \text{ 400's} = 0.7359 + 0.0000003 \text{ VOL} + 0.344 D$$

$$(9.148) \quad (1.776) \quad (1.880)$$

$$R^2 = 0.285 \quad \text{d.f.} = 15$$

$$(6) \text{ 500's} = 4.036 + 0.0000023 \text{ VOL} + 4.0317 D$$

$$(17.155) \quad (4.3098) \quad (7.539)$$

$$R^2 = 0.8206 \quad \text{d.f.} = 15$$

$$(7) \quad 600's = 9.981 + 0.0000024 \text{ VOL} - 1.845 \text{ D} \\ (26.266) \quad (2.747) \quad (-2.136)$$

$$R^2 = -.4775 \quad d.f. = 15$$

$$(8) \quad 700's = 9.057 + 0.0000042 \text{ VOL} - 1.762 \text{ D} \\ (19.268) \quad (3.922) \quad (-1.648)$$

$$R^2 = 0.5706 \quad d.f. = 15$$

$$(9) \quad 800's = 8.499 - 0.000005 \text{ VOL} + 7.062 \text{ D} \\ (9.921) \quad (0.245) \quad (3.626)$$

$$R^2 = 0.476 \quad d.f. = 15$$

$$(10) \quad 900's = 14.505 - 0.0000009 \text{ VOL} + 1.199 \text{ D} \\ (38.8) \quad (-1.035) \quad (1.4120)$$

$$R^2 = 0.1876 \quad d.f. = 15$$

The R^2 's of these equations vary widely and this indicates that more research needs to be done on which items to include as other independent variables to produce equations with better fit.